

## Dromiidae (Crustacea, Decapoda, Brachyura) from Madagascar and the Seychelles

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**Résumé.** — L'étude d'une collection de Dromiidae récoltés à Madagascar et aux îles Seychelles, ainsi que le réexamen des spécimens de cette famille, provenant de l'océan Indien occidental et de la mer Rouge et conservés dans les collections du Muséum national d'Histoire naturelle, à Paris, permet de recenser dix-neuf espèces dont trois, *Dromidiopsis dubia*, *Dromidiopsis plumosa* et *Conchoecetes intermedia*, sont nouvelles. Parmi les dix-neuf espèces examinées, dix ont une large distribution indo-ouest-pacifique, six ne sont connues que de l'océan Indien et sept se trouvent en mer Rouge. Par ailleurs, *Petalomera nodosa* Sakai, 1936, qui était considérée comme endémique du Japon, est signalée à Madagascar, tandis que *Sphaerodromia nux* Alcock, 1899, qui n'était connue que par les deux spécimens-types, est redécrite après la récolte, à Madagascar, de quatre nouveaux spécimens.

**Abstract.** — The study of a collection of Dromiidae collected around Madagascar and the Seychelles Islands, together with a new examination of the specimens of this family of western Indian Ocean or of the Red Sea origin, deposited in the Muséum national d'Histoire naturelle, Paris, allow to list nineteen species, of which three, *Dromidiopsis dubia*, *D. plumosa* and *Conchoecetes intermedia*, are new. Ten out of the nineteen identified species have a vast Indo-West-Pacific distribution, six appear as restricted to the Indian Ocean, and seven inhabit the Red Sea. *Petalomera nodosa* Sakai, 1936, was considered as endemic from Japan, but is here mentioned from Madagascar. Four specimens of *Sphaerodromia nux* Alcock, 1899, that was previously known from two syntypes only, have been collected in Madagascar, and the species is redescribed.

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Most of the present material was collected during research programmes carried out by scientists of ORSTOM (Office de la Recherche Scientifique et Technique Outre-Mer), France, at Madagascar. The Seychelles material was collected during a joint project of ORSTOM and the Government of the Republic of the Seychelles, called "Reves 2" (Resources Évaluées par Échointégration aux îles Seychelles, 2<sup>e</sup> campagne). In addition to this material the Paris Museum transferred to me some older one from the western Indian Ocean and the Red Sea, for re-examination.

The present collection contains nineteen species, three of which represent new species. Ten species have a wide distribution in the Indo-West Pacific region; whereas six are reported from the Indian Ocean only and seven inhabit the Red Sea.

Apart from a small number of duplicates, which were donated to the Zoological Museum of the Tel-Aviv University (TAU) and the Rijksmuseum van Natuurlijke Historie, Leiden (RMNH), the entire collection is held by the Muséum national d'Histoire naturelle, Paris (inventory number B. ...).

The synonymies of the species contain the reference to the original description and to records from the western Indian Ocean. Other important synonymies are sometimes included. For re-examined material published records are given in brackets.

The carapace length and breadth of the various specimens is given as cl. x cb. (10 × 10 mm, for example).

I wish to express my sincere gratitude to Dr. A. CROSNIER (ORSTOM) and M. R. CLEVA (Muséum national d'Histoire naturelle, Paris) for entrusting me with the study of this interesting material. I also wish to thank the director and the colleagues at the Rijksmuseum van Natuurlijke Historie, Leiden, and especially Pr. L. B. HOLTHUIS, for their hospitality in allowing me to work at the museum and to consult its collections and library. I would also like to acknowledge Pr. Jacques FOREST, for allowing me to work on specimens from the Muséum national d'Histoire naturelle, Paris, Dr. D. GRIFFIN, The Australian Museum, Sydney, for loan of the specimens of *Dromidiopsis australiensis*, and Dr. R. W. INGLE and Mr P. CLARK, British Museum (Nat. Hist.), London, for the loan of additional specimens of this species. Pr. HOLTHUIS and Dr. INGLE assisted with the English text. The photographs of *Dromidiopsis dromia* were taken at the Rijksmuseum van Natuurlijke Historie, and all the others by Ms. L. MAMAN of our Department.

## DROMIA Weber, 1795

### *Dromia dehaani* Rathbun, 1923

(Pl. I A)

*Dromia dehaani* Rathbun, 1923 : 68, 69 ; SAKAI, 1936 : 8-10, pl. 5 fig. 1 ; LEWINSOHN, 1977 : 5-9, pl. 1.

*Dromia dormia* — STEBBING, 1905 : 61, 62 ; STEBBING, 1910 : 342 (part) ; BARNARD, 1950 : 310, 311, text fig. 58c, e (not *D. dormia* (L.)).

MATERIAL : Ambaro Bay, N.W. coast, Madagascar, 7 m deep, trawl, February 1959, leg. A. CROSNIER, 4 ♂♂ 52 × 61 mm, 53 × 62 mm, 37 × 45 mm, 28 × 31 mm (RMNH, D. 35229) ; 10-20 m deep, trawl, 4 March 1975, leg. A. CROSNIER, 1 ♂ 37 × 42 mm (B. 6916) ; trawl, 4 September 1965, leg. R. PLANTE, 1 juv. 15 × 16 mm (B. 6896). — N.W. coast, 12°55.2' S, 48°28.2' E, Madagascar, 42 m deep, trawl, 2 August 1973, leg. A. CROSNIER, 1 juv. 10 × 10.5 mm (B. 6905) ; same locality and same details, 1 juv. 6.5 × 6.5 mm (B. 6911). — N. W. coast, 12°49.5' S, 48°30.0' E, Madagascar, 55 m deep, trawl, 2 August 1973, leg. A. CROSNIER, 1 juv. 6.5 × 6.5 mm (B. 6910). — Near Baie des Russes (region of Nosy Be), N.W. coast, Madagascar, 25 m deep, trawl, 6 December 1973, leg. A. CROSNIER, 1 ♀ 39 × 46 mm (B. 6870). — Nosy Be, Madagascar, 15 m deep, sand, January 1962, leg. A. CROSNIER, 1 juv. ♀ 13 × 13 mm (B. 6854) ; intertidal zone or deeper, leg. M. CHAVANE, 1 juv. ♀ 10 × 10.5 mm (B. 6900) ; intertidal zone or deeper, leg. M. CHAVANE, 1 ♀ 36 × 43 mm (B. 6889). — Near Tany Kely (region of Nosy Be), 25 m deep, May 1966, 1 ovig. ♀ 59 × 70 mm (B. 6871). — Baly Bay, 16°01' S, 45°20' E, Madagascar, 14 m deep, sand, trawl, 1959, leg. A. CROSNIER, 1 ♂ 28 × 33 mm (B. 6855). — Near Nosy Komba, N.W. coast, Madagascar, 17-20 m deep, 13 January 1971, leg. A. CROSNIER, 1 ovig. ♀ 61 × 71 mm (B. 6868). — Off S. coast, 25°06' S, 47°03' E, Madagascar, 75 m deep, 3 November 1973, N.O. "FAO 60", 1 ♂ 76 × 92 mm (B. 6923). — Seychelles, Reves 2 Station 42, 4°31.6' S, 56°09.7' E, 62 m deep, sandshells, trawl, 13 September 1980, 1 ♀ 52 × 60 mm (TAU) ; Reves 2 Station 67, 4°44.2' S, 55°19.8' E, 63 m deep, trawl (shrimp net), 20 September 1980, 1 ♂ 68 × 79 mm (B. 7760).

## REMARKS

RATHBUN (1923) showed that two distinct species had been confused under the name *Dromia dormia* (L.). The true *Cancer dormia* L. was placed by her in the genus *Dromidiopsis* as *Dromidiopsis dormia* (L.); the other species was retained in the genus *Dromia* and designated by RATHBUN as a new species *Dromia dehaani*. RATHBUN did not provide figures of this new species, but referred to various illustrations published in the literature. A good description of *Dromia dehaani* was published by SAKAI (1936) and LEVINSON (1977) gave an extensive comparison between this species and a juvenile male of *Dromidiopsis dormia*, recording the former species from the Red Sea.

The present series of specimens of *D. dehaani* confirms the characteristics described in published accounts. A few additional features are listed here :

1. The carapace is clearly broader than long, except in very young specimens (cl. 6.5 mm) in which the length equals the width. The length/width ratios increase with age (or size). In specimens of 10-15 mm el., the width exceeds the el. by only about 1 mm, the difference being quite inconspicuous. In specimens with el. 25-28 mm this difference is about 3-5 mm, in specimens with el. 37-53 mm it is 8-9 mm, and in those with el. 60-70 mm it is about 10-11 mm; the largest specimen has a carapace length of 76 mm and a width of 92 mm, the difference thus being 16 mm. The presence of fringes of setae along the lateral margins of the carapace increases the apparent width. Denuded the carapace of most specimens is a pale yellowish-grey colour with dark marbling. In most of them there is a large brownish red pigment spot on the gastric region and several similar smaller spots are visible on the anterior part of the carapace. Such pigment spots have been observed also in other species of Dromiidae.

2. The fifth pereopods are only moderately longer than the fourth. In a male with a el. of 53 mm, P4 is 33 mm long and P5 42 mm; (all segments, except the dactylus, were measured over the middle of the surface). Extended forward, P5 reaches slightly beyond the last anterolateral tooth of the carapace.

3. In the smaller of the three females (el. 10-13 mm) the sternal grooves end between the bases of P3 and are not elevated. In the next largest female (el. 36 mm) and in larger specimens these grooves extend to the level between P1 and P2. No tubercles are visible in this specimen or in one el. 39 mm. In the largest of the three females (el. 52-61 mm) — the smallest impregnated, the other two ovigerous — the grooves each end in a tubercle of about 5 mm high. These tubercles are placed close together but are separated by a groove; their apices are directed obliquely outward.

The measurements of this species, as well as of the following, are not to be considered absolute standards. It is well known that small ovigerous specimens of Dromiids show characters (e.g. presence of tubercles at the end of the sternal grooves) which otherwise are only found in much larger adult specimens. The presence of such tubercles is probably more an indication that the crab is sexually mature than that it is fully grown.

In the small females (el. 10-39 mm) mentioned above, the abdomen has not yet widened.

The largest specimen recorded has a cl. of 86 mm, and a cb. of 102.4 mm (RATHBUN, 1923).

The characters that distinguish this species from *D. intermedia* are discussed on p. 94.

#### VERTICAL DISTRIBUTION

The species seems to prefer rather deep water. SAKAI (1936) reported it from depths between 30 and 100 m, and later (SAKAI, 1976) between 50-150 m. Depth records in the older literature cannot be used since their authors as a rule did not distinguish between the present species and *D. dormia*. The present specimens show that the species also is found in water less than 30 m deep.

#### GEOGRAPHICAL DISTRIBUTION

This species has a wide Indo-West Pacific distribution, viz., from the Red Sea and South Africa to Japan. RATHBUN (1923) enumerated the old records for the species. In the western Indian Ocean *D. dehaani* is relatively little known, the records from that area are : Natal Bay (STEBBING, 1905, as *D. dormia*). Delagoa Bay ; off Tugela river and N. of Durbar (BARNARD, 1950, as *D. dormia*). Gulf of Aden (RATHBUN, 1923). Red Sea (LEWINSOHN, 1977).

#### *Dromia intermedia* Laurie, 1906

(Pl. 1 B)

*Dromia intermedia* Laurie, 1906 : 351 ; IHLE, 1913 : 23-25, pl. 1 figs. 1-3 ; SAKAI, 1936 : 10, 11, pl. 6 fig. 1 ; SAKAI, 1976 : 8, 9, pl. 1 fig. 3.

MATERIAL : Ste Luce, S.E. coast, Madagascar, 60 m deep, sand, trawl, 20 October 1951, leg. A. CROSNIER, 1 ♂ 40 × 43 mm, 1 ♀ 40 × 43 mm (B. 6877). — Between Majunga and Narendry Bay, N.W. coast, Madagascar, 7-40 m deep, trawl, 14-15 April 1970, leg. R. PLANTE, 1 juv. ♀ 10 × 10 mm (B. 6902). — South Mitsio Ids., N.W. coast, Madagascar, 26 m deep, sand, trawl, June 1959, leg. A. CROSNIER, 1 ♂ 24 × 24 mm (B. 6873). — Mitsio Ids., N.W. coast, 40 m deep, sand, trawl, February 1960, leg. A. CROSNIER, 1 ♂ (damaged) 35 × 37 mm (B. 6876). — S.W. Mitsio Ids., 30 m deep, sand, February 1960, leg. A. CROSNIER, 3 ♀♀ 13 × 13 mm, 18 × 18 mm, 27 × 28 mm (B. 6875). — N.W. coast, 12°55.2' S, 48°28.2' E, Madagascar, 42 m deep, trawl, 2 August 1973, leg. A. CROSNIER, 1 ♂ 32 × 34 mm, 1 juv. 7 × 7 mm (B. 6866 ; B. 6905). — N.W. coast, 13°07.3' S, 48°25.8' E, Madagascar, 30 m deep, trawl, 2 August 1973, leg. A. CROSNIER, 1 ovig. ♀ 28 × 28 mm (B. 6865). — N.W. coast, near Baie des Russes (region of Nosy Be), Madagascar, 25 m deep, trawl, 6 December 1973, leg. A. CROSNIER, 1 ♂ (badly damaged), 1 juv. ♂ 20 × 20 mm (B. 6867). — Pracel Bank, W. coast (17°00' S, 43°30' E), Madagascar, 55 m deep, sand-mud, June 1959, leg. A. CROSNIER, 2 juv. ♀♀ 12 × 12 mm, 15 × 15 mm (B. 6874). — Seychelles, Reves 2 Station 35, 4°38.5' S, 54°52.8' E, 50-60 m deep, sand-mud, trawl, 10 September 1980, 1 ♂ 40 × 43 mm (TAU) ; Reves 2 Station 41, 4°44.0' S, 56°15.1' E, 50 m deep, sand and shells, trawl, 13 September 1980, 1 juv. ♀ (B. 7757) ; Reves 2 Station 47, 4°03.8' S, 55°59.5' E, 45 m deep, sand, dredge, 14 September 1980, 1 juv. ♀ with sponge 21 × 21 mm (RMNH, D. 35228) ; Reves 2 Station 52, 3°52.8' S, 55°25.3' E, 59 m deep, dredge, 15 September 1980, 1 ♂ 9.5 × 9.5 mm (B. 7756) ; Reves 2 Station 58, 4°12.2' S, 54°39.3' E, 60 m deep, trawl, 19 September 1980, 1 ♂ (fresh molted) 27 × 30 mm (B. 7759) ; Reves 2 Station 60, 4°11.2' S, 55°12.6' E, 41-50 m deep, trawl, 19 September 1980, 1 juv. ♂ 17 × 17 mm (RMNH, D. 35227) ; Reves 2 Station 62A, 4°26.4' S,



55°41.9' E, 32 m deep, sand and corals, dredge, 20 September 1980, 1 ♀ 17 × 17 mm (B. 7758); Reves 2 Station 68, 4°11.6' S, 55°59.8' E, 60-65 m deep, mud, trawl, 21 September 1980, 1 juv. ♂ 11 × 11 mm, 1 juv. ♀ 14 × 14 mm (B. 7754).

#### REMARKS

So far little information has been published about this species, as the records relate to not more than a few specimens. The largest numbers have been found in Japan as mentioned by SAKAI (1976).

The original brief description by LAURIE (1906) is based on a single female (el. 23.5 mm) and, apart from some measurements, the account is limited to a comparison with *Dromidiopsis cranioides* (De Man). The most extensive description is provided by LILLE (1913), whose material consisted of a rather large female (el. 32.5 mm) in which P4 and P5 were missing. The more detailed account by SAKAI (1936) mentioned the arrangement of spines at the end of the propodus and dactylus of P4 and P5.

The present material is represented by a good series of various sizes, which makes it possible to describe additional features.

1. Relation between earapae length (measured from the end of the central frontal tooth to the posterior margin) and width (measured between the tips of the third anterolateral teeth). In specimens of el. 25 mm and less, the earapae length and width are practically equal; in larger specimens the width slightly exceeds the length, the difference being about 2 mm in specimens of 30 mm el. and about 3 mm in specimens of 40 mm el. These differences are so small that the earapae of larger specimens give the impression of being about as long as broad.

2. LAURIE (1906) described the posterior pereopods as: « (1) Walking leg 4 but little longer than walking leg 3; ... ». This may be true for the small specimens examined by LAURIE; the measurements given for these legs are based on the length of the distal four segments and show P5 (walking leg 4) to be about 2 mm longer than P4 (walking leg 3). In larger specimens, however, the difference in the length of the two legs is more distinct, P5 being considerably longer than P4. In a present specimen of 40 mm el. the total length of P4 (all segments measured over the middle of the surface) is 32 mm that of P5 45 mm. When P5 is stretched forward it reaches the second anterolateral tooth of the earapae.

3. The arrangement of the spines on the distal part of P4 and P5 was described by SAKAI, and is fully confirmed by my material. This character is of specific importance. In all my specimens the propodus of P5 bears two spines opposing to the dactylus one of which is more slender than the other. The posterior margin (= outer margin) of the dactylus has a small spine; near this spine the distal margin of the propodus bears three spines: one, larger, behind the dactylus, and two smaller spines, more to the outside. The propodus of P4 carries a spine opposite the dactylus and 2 (often 3) behind the dactylus.

4. The subhepatic region of the earapae has a dorsoventral groove in the area of the so-called suprasutural ridge. This groove ends between the first and second anterolateral teeth. It divides the suprasutural ridge in two and is very distinct, being even visible before removal of the tomentum.

5. The present series of specimens clearly shows that the end of the sternal grooves

of the female during growth moves in a forward direction. In specimens of 13 mm cl. these grooves end at the posterior margin of the somite of P2, in those with a cl. of 21 mm between the bases of P2, and in specimens exceeding 27 mm cl., at the border between the somites of P2 and P1. In specimens with a cl. of 21 mm and less the grooves do not end in tubercles. In larger specimens the size of such tubercles seems to depend more on the sexual maturity of specimens rather than on their size. The only ovigerous (cl. 28 mm) and an impregnated female (cl. 27 mm) have tubercles which are distinctly larger than those of the largest female (cl. 40 mm). In all the three females (cl. 27-40 mm) these tubercles are separated by a noticeable distance and not just by a groove as seen in *Dromia dehaani*.

The abdomen of females with a carapace length of 21 mm and less is still quite narrow.

The reported maximum size of this species is 49 mm cl. (SAKAI, 1976).

*Dromia intermedia* can be distinguished from *D. dehaani* by the following characters :

1. The carapace of *D. intermedia* is almost as long as wide ; in *D. dehaani* it is distinctly wider than long.

2. The central of the three frontal teeth in *D. intermedia* is very small and hardly visible in dorsal view ; in *D. dehaani* it is only slightly smaller than the lateral frontal teeth.

3. The supraorbital tooth of *D. intermedia* is large, being only slightly smaller than the lateral frontal teeth. In *D. dehaani* the supraorbital tooth is very small, and is represented by a mere denticle.

4. The posterolateral tooth of *D. intermedia* is directed obliquely forward, pointing in the same direction as the anterolateral teeth. In *D. dehaani* the posterolateral tooth is directed more outward ; the anterior margin of the tooth forms an angle of about 90° with the margin of the carapace.

5. In *D. intermedia* the suprasutural ridge is divided into two by a dorso-ventral groove which ends between the first and second anterolateral teeth. This groove is absent in *D. dehaani*.

6. In *D. intermedia* the dactylus of P2 and P3 bears fringes of long setae along the upper margin, and on each lateral surface. In *D. dehaani* this dorsal fringe is absent, although the two lateral fringes are quite distinct.

7. In *D. intermedia* the dactylus of P5 bears a spine at its hind margin ; two spines are present on the propodus opposite the dactylus and three more behind the dactylus. In *D. dehaani* none of these spines are present except a single one opposite the dactylus.

8. In *D. intermedia* P5 is distinctly longer than P4 and, when extended forward, reaches as far as the second anterolateral tooth. In *D. dehaani* P5 is only slightly longer than P4 and when extended reaches only as far as the posterolateral tooth.

#### VERTICAL DISTRIBUTION

LAURIE (1906) reported the type specimen from " deep water " without a more accurate depth indication. IHLE (1913) mentioned a female from a depth of 112 m. SAKAI (1976)

gives a depth of 15-50 m for Japanese specimens, after previously (SAKAI, 1936) having reported the species from 54-90 m (= 30-50 fm). The present specimens, from between 25 and 60 m depth, agree best with the Japanese records.

#### GEOGRAPHICAL DISTRIBUTION

Only few records of the present species have been published. The type locality is off Galle, southwest coast of Ceylon (LAURIE, 1906), the other records are from the south coast of Timor (IHLE, 1913), and from various localities in Japan (SAKAI, 1936, 1976). As far as I know the species has not been reported previously from the western Indian Ocean.

### DROMIDIOPSIS Borradaile, 1900

#### *Dromidiopsis dormia* (Linnaeus, 1763)

(Pl. II)

*Cancer dormia* Linnaeus, 1763 : 413.

*Dromia hirsutissima* — DANA, 1852 : 403 (part).

*Dromidiopsis dormia* — RATHBUN, 1923 : 67, 68 ; SAKAI, 1936 : 11, 12, pl. 5 fig. 2 ; WARD, 1942 : 70 ; SAKAI, 1976 : 9, pl. 3.

? *Dromia Rumphii* — HILGENDORF, 1878 : 812 (part).

? *Dromia dormia* — MACNAE & KALK, 1958 : 71, 117, 125.

non *Dromia dormia* — STEBBING, 1905 : 61, 62 ; STEBBING, 1910, 342 (part) ; BARNARD, 1950 : 310, 311, text fig. 58c, e = *Dromia dehaani* Rathbun.

non *Dromia dormia* — STEBBING, 1910 : 342 (part) = *Dromidia aegibotus* Barnard.

non *Dromia dornica* — BALSS, 1913 : 109 = ? *Dromidia aegibotus* Barnard.

MATERIAL : Pte d'Ankify, Madagascar (13°32' S, 48°21' E) ; 1965, 1 ♂ (dry) 114 × 145 mm (B. 6924). — Nosy Bé, Madagascar ; bought from fishermen, leg. A. CROSNIER, 1 ♂ 115 × 150 mm (B. 6925).

#### REMARKS

As already mentioned under *Dromia dehaani*, until 1923 two species were confused under the name *Dromia dormia* (Syn. *D. rumphii*) until RATHBUN placed *Cancer dormia* L. into the genus *Dromidiopsis* Borradaile, retaining the name *Dromia dehaani* for the other species. RATHBUN compared the two species and enumerated their differences. SAKAI (1936) gave a good description of the present species, and LEWINSON (1977) compared a juvenile male of *D. dormia* with *D. dehaani*. Descriptions of *Dromia dormia* (or *D. rumphii*) published before 1923 may be based on either or both species.

The two large males of the present species at my disposal agree completely with the account of RATHBUN (1923).

*Dromidiopsis dormia* differs from *Dromia dehaani* and *D. intermedia* Laurie, in the following features :

A — From *D. dehaani*

1. In adult specimens of *D. dormia* the central frontal tooth is more prominent than the lateral teeth (in juvenile animals the three teeth are probably of about the same length); in *D. dehaani* the central frontal tooth is somewhat shorter than the laterals.

2. In *D. dormia* there is no supraorbital tooth, although there may be a slight swelling in its place; in *D. dehaani* a small supraorbital tooth is present.

3. In *D. dormia* the carapace is provided with 4 anterolateral teeth that differ in size: The first is very large and the third quite small. In *D. dehaani* there are three anterolateral teeth, which are of about equal size.

4. In *D. dormia* the posterolateral tooth is directed obliquely forward, pointing in the same direction as the anterolateral teeth; in *D. dehaani* the posterolateral tooth is directed more outward and is not parallel to the other teeth.

5. The dactylus of P2 and P3 of *D. dormia* is distinctly shorter than the propodus, and its upper margin is not naked; in *D. dehaani* the dactylus is almost as long as the propodus and its upper margin bears no setae.

6. The dactylus of P5 in *D. dormia* is opposed by two spines on the propodus; in *D. dehaani* only a single spine is present there.

B — From *Dromia intermedia*

1. The carapace in *D. dormia* is considerably broader than long (in juveniles probably less so); in *D. intermedia* the carapace is almost as long as broad.

2. The central frontal tooth in *D. dormia* is strong; in *D. intermedia* it is very small and hardly visible in dorsal view.

3. In *D. intermedia* a large supraorbital tooth is present; this tooth is absent in *D. dormia*.

4. In *D. dormia* there are four unequal anterolateral teeth (see A3 above); in *D. intermedia* there are three teeth of equal size.

5. In *D. intermedia* the suprasutural region is divided into two by a dorsoventral groove; such a groove is not present in *D. dormia*.

6. In *D. intermedia* the dactylus of P5 bears a spine on its posterior margin; this spine is not present in *D. dormia*.

To these differences should be added the character that differentiates the genera *Dromia* and *Dromidiopsis*, viz. the position of the sternal grooves of the females: In *Dromia* these two grooves are separated and each terminates in a tubercle, whereas in *Dromidiopsis* the two grooves end close together on a single median tubercle. In juvenile females this difference is not apparent as the tubercles are not yet present.

VERTICAL DISTRIBUTION

SAKAI (1976) mentioned 20-50 m as the depth range of this species. The present specimens were not accompanied with indication of depth.

GEOGRAPHICAL DISTRIBUTION

As the identity of much of the material previously reported as *Dromia dormia* is not certain, the actual range of the species is insufficiently known. RATHBUN (1923), who was the first to recognize the true status of the present species, defined its range as follows: "... stretching from the Hawaiian Islands southwestwards to the Moluccas, the Red Sea and the Cape of Good Hope...". Since then the species has also been found in Japan (SAKAI, 1936, 1976). LEWINSOHN (1977) showed that all records of *D. dormia* from the Red Sea are actually based on *D. dehaani*; so far *D. dormia* is not known from the Red Sea at all. Likewise it is not certain that the species is found in South Africa. The specimens mentioned by BARNARD (1950) from South Africa as *D. dormia*, founding on BARNARD's description and figures seem to be *D. dehaani* and the same is true for the material from Natal reported by STEBBING (1905). According to BARNARD (1950), the specimen from Buffalo Bay that STEBBING (1910) recorded as *D. dormia* in reality belongs to *D. aegibotus* Barnard. BARNARD furthermore also assumed that the specimen from False Bay reported by BALSS (1913) as "*Dromia dornica*" (a lapsus for *Dromia dormia*) probably belonged to *D. aegibotus*. Only RATHBUN (1923) may have seen a "real" *D. dormia* from South Africa (Cape of Good Hope), namely the specimen described by DANA (1852 : 403) as *D. hirsutissima*. RATHBUN also assigned to *D. dormia* the specimens that HILGENDORF (1878) reported from Inhambane, Mozambique, under the name *Dromia Rumphii*. HILGENDORF's description, however, is not detailed enough to allow RATHBUN's statement to be implicitly accepted. Also the identity is not clear of the specimens from the Gulf of Aden (Obock, Djibouti) reported by NOBILI under the name *Dromia Rumphii*; it is possible that they belong to *D. dehaani*. Finally, WARD (1942) mentioned the species from Mauritius, but without any remarks. It is not impossible therefore that the present two specimens are the first of this species to be recorded from the western Indian Ocean.

***Dromidiopsis tridentata* Borradaile, 1903**

(Fig. 1)

*Dromidia australiensis* — DE MAN, 1888 : 396-398, pl. 17 fig. 6; HENDERSON, 1893 : 406 (not *Dromia australiensis* Haswell, 1882).

*Dromidia australiensis* var. — DE MAN, 1896 : 372 (not *D. australiensis* Haswell).

*Dromidiopsis australiensis* — BORRADAILE, 1900 : 572; BORRADAILE, 1903a : 675; IBLE, 1913 : 30, 31 (not *D. australiensis* Haswell).

*Dromidiopsis tridentatus* Borradaile, 1903 : 576, 577, pl. 33, fig. 2a.

*Dromidiopsis tridentata* — BALSS, 1934 : 502; GUINOT, 1967 : 239 (list).

MATERIAL : Off Nosy Komba, N.W. coast, Madagascar, dredge, 14 March 1971, leg. M. CHAVANE, 1 ♀ 12 × 12 mm (TAU). — S.W. of Mitsio Ids., N.W. coast, Madagascar, 30 m deep, sand, February 1960, leg. A. CROSNIER, 1 ♀ 12 × 12 mm (B. 6881). — Glorieuses Ids, N.W. of Madagascar, intertidal zone, 16 September 1958, leg. A. CROSNIER, 1 juv. 4.5 × 4.5 mm (B. 6887). — Anjouan Ids., Comores, intertidal zone, November 1961, leg. A. CROSNIER, 1 ♂ 9.5 × 10 mm (B. 6882). — Seychelles, Reves 2 Station 42, 4°31.6' S, 56°09.7' E, 62 m deep, sand-shells, dredge, 13 September 1980, 1 ♂ 13 × 12 mm (TAU). — Mombasa, Kenya, 12 January 1974, leg. A. J. BRUCE, 1 ♀ (damaged) eb. 18 mm (B. 7391).

RE-EXAMINED MATERIAL : Mayotte Id., Comores, leg. A. MILNE EDWARDS, det. BALSS, 1 ♀ (out of two) (B. 6963) (BALSS, 1934 : 502).

DESCRIPTION

The carapace is as long as broad and is covered by a short tomentum. Denuded the surface of the carapace is smooth and shiny. The regions are hardly indicated, only the branchial groove is distinct. The median frontal tooth is small and hardly visible in dorsal view. The lateral frontal teeth are more pronounced, but still are quite small

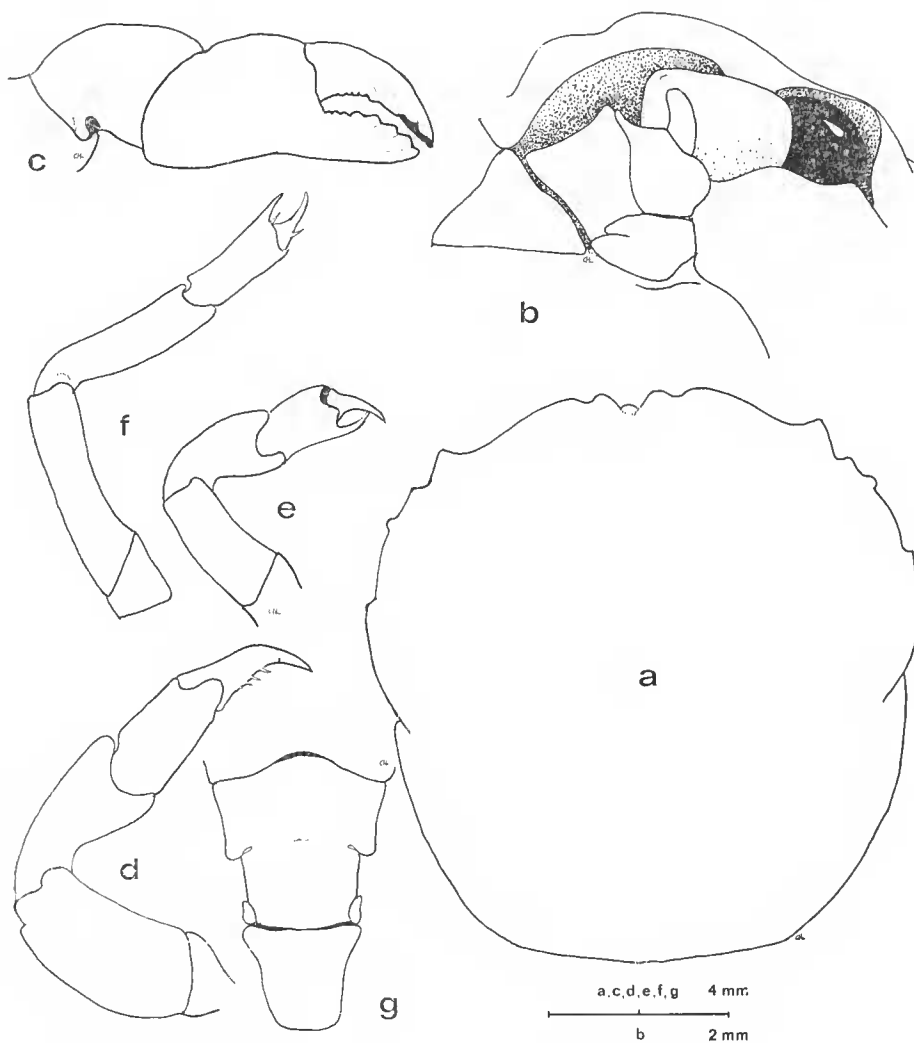


FIG. 1. — *Dromidiopsis tridentata* Borradaile : a, carapace ; b, frontal view (note the form of the infra-orbital lobe and the epistome) ; c, right cheliped ; d, third pereiopod ; e, fourth pereiopod ; f, fifth pereiopod ; g, last three abdominal somites (note the fused 5th and 6th segments).  
a, b, g : from male, cl. 13 mm (TAU) ; c, d, e, f : from female, cl. 12 mm (TAU). (Setae omitted.)

and have the apex rounded ; they are only slightly set off from the margin. There is no supraorbital tooth and the inner orbital angle is not marked. The outer orbital angle is distinct, but does not have a tooth. The infraorbital lobe is triangularly rounded and relatively broad. There is a fissure between the outer orbital angle and the infraorbital lobe. The anterolateral margin of the carapace bears three small teeth ; two of these are placed close to the orbit. The first tooth is slightly larger than the second and is placed slightly lower, namely at the level of the orbital fissure. In one of the females the second tooth is missing. The third tooth lies halfway between the second tooth and the branchial groove. The entire anterolateral margin of the carapace is convexly arched ; this is more distinct in the females than in the males. The suprasutural region and the buccal region are without teeth.

The cheliped has an epipodite. The upper margin of the palm of the chelipeds carries three granules, which can be observed only after the removal of the tomentum. Otherwise the margins and the surface of the various segments of the chelipeds are smooth. In some specimens the fingers are of a pink colour with the extreme tips white ; in the other specimens the fingers are white.

P2 and P3 are robust and smooth. The dactylus is slightly shorter than the propodus. The lower margin of the dactylus carries four spines, the distal of which, situated immediately behind the claw, is flanked at either side with a few long setae.

The margins of the segments of P4 and P5 carry long plumose setae. P4 is shorter than P5. When extended forward, P5 reaches almost to the outer orbital angle. P4 carries a spine in the distal part of the propodus, opposite the dactylus. P5 has two spines in that region, one of which is quite small and therefore easily overlooked. The outer margin of the dactylus carries a distinct spine. Two spines are placed in the distal part of the propodus near the outer margin of the dactylus. These spines are more or less obscured by plumose setae ; in lateral view only a single spine is visible.

The telson of the male is as broad as long (the breadth measured at the base). The posterior margin of the telson is truncated and bears a fringe of long setae. The fifth and sixth abdominal somites are fused. The border between these two segments is indicated only by an incision in the lateral margin of the abdomen connected by a shallow and narrow groove but there is no true articulation. Also in the female, segments five and six of the abdomen are fused. The larger the specimens, the more distinct the lateral incisions.

In a female with cl. 12 mm the sternal grooves end between the bases of the chelipeds at an elevation, which is flattened. In a slightly smaller female (cl. 11.5 mm) the grooves end between the bases of the second legs and the elevation is hardly noticeable. In this second female the abdomen is noticeably narrower than in the larger female. In a female with cl. 8.5 mm (Siboga-Expedition, specimen in the Rijksmuseum van Natuurlijke Historie, Leiden, reg. no. D. 3120) the sternal grooves end likewise between the bases of the second legs. In this smaller female the abdominal segments five and six are fused.

#### REMARKS

BORRADAILE (1903a) described and figured *Dromidiopsis tridentata* (as *D. tridentatus*) based upon a single female (cl. 11 mm) from Hulule, Male Atoll, Maldive Islands. In the same paper, BORRADAILE also mentioned specimens of *Dromidiopsis australiensis* (Haswell)

of which he distinguished two varieties — *bidens* and *unidens*; in the former the middle of the three anterolateral teeth of the carapace is lacking, while in var. *unidens* two of the three teeth are absent. A specimen from Celebes described by DE MAN (1896) was assigned by BORRADAILE to var. *bidens*. A specimen from Fiji and one from Rotuma, both already listed by BORRADAILE (1900), were assigned by him (1903a) to var. *unidens*. BORRADAILE'S conception of *Dromidiopsis australiensis* is obviously that of the species described under that name by DE MAN (1888). In dealing with *D. tridentata*, BORRADAILE stated that it closely resembles *D. australiensis*, but can be distinguished by the following characters: "..... by the more distant and more outstanding teeth of the anterolateral edge, which in *D. australiensis* are broader at their base, by the sternal grooves of the female, which meet and end on the segment of the first walking-leg, and by the presence of a spine on the hinder edge of the propodite of the fifth leg...". This difference in the anterolateral teeth is not clear and cannot be deduced either from the description or from the figure. As far as the sternal grooves are concerned, as mentioned above, these can end between the first or second pereopods depending on age or size. All my specimens have a spine on the hinder edge of the propodus of the fifth leg.

It is clear that the above cited differences are not of specific value and fall within the range of variations of a single species. Therefore, if the species described by DE MAN (1888) as *D. australiensis* proves to be misidentified, and is different from the true *D. australiensis* (Haswell), then the name *D. tridentata* Borradaile becomes available for it.

DE MAN'S description was exclusively based on his own material from Amboina, and he had seen neither HASWELL'S type material nor any other specimens of that species. He based the identification of his material of *D. australiensis* exclusively on a comparison with HASWELL'S meagre description. As DE MAN'S description was far more extensive than HASWELL'S it is not surprising that later authors compared their material with DE MAN'S extensively illustrated description rather than with HASWELL'S short unillustrated account. Consequently most of the records of *D. australiensis* in the literature are more likely to represent *D. tridentata* rather than *D. australiensis*.

Through the kindness of Dr. D. GRIFFIN of the Australian Museum Sydney, I received for examination two dry specimens of *D. australiensis* from the type localities preserved in that Museum, viz. 1 ♂, cl. 34 mm, cb. 33 mm, Port Jackson, N.S.W., Australia, Old Collection, P. 3052; 1 ♀, cl. 25 mm, cb. 24 mm, Port Denison, Qld., 5 fms, Coll. W. A. HASWELL, March 1912, P. 3050. Both specimens were indicated on the loan form as "Paratypes". HASWELL did not designate a holotype and as far as I am aware a lectotype has not been selected for this species. Also, the specimen from Port Denison was collected 30 years after the publication of *D. australiensis* and cannot be considered as a part of the types series. Therefore only the specimen from Port Jackson, probably is the only true syntype. The Port Denison specimen can only be regarded as a topotype.

From the British Museum (Natural History), I received a third specimen of *D. australiensis*, viz. a female, cl. 18 mm, cb. 16.5 mm, N.W. Australia, 1931: 5: 15: 50.

A comparison of my material with the above mentioned three specimens from Australia revealed that they belong to different species, viz. *D. tridentata* and *D. australiensis*. It is clear that DE MAN'S (1888) material belongs to *D. tridentata*, this also is true of the material assigned to *D. australiensis* listed above in the synonymy of *D. tridentata*. The only certain records so far of *D. australiensis* are from Australia.



The two species resemble one another in two most peculiar characters : 1) the arrangement of the spines on the dactylus of P5 is remarkably similar in the two species ; 2) the abdominal somites five and six are fused as described above for *D. tridentata*. The latter character also is shown by another species : *Dromidiopsis edwardsi* Rathbun.

The differences between *D. australiensis* and *D. tridentata* are listed as follows :

1. In *D. australiensis* the lateral frontal teeth are stronger than those of *D. tridentata*.

2. In *D. australiensis* the inner orbital angle is distinct, while in *D. tridentata* the frontal margin and the orbital margin merge gradually. *D. tridentata* hereby acquires a very characteristic shape. In the large specimens of *D. australiensis* the frontal margin (with exception of the frontal teeth) is strongly curved upwards ; in the small specimens this features is far less distinct.

3. In *D. australiensis* the anterior anterolateral tooth of the carapace is larger than the following teeth, it is very wide at the base and usually provided with an additional small tooth (similar to the one in *Dromidiopsis edwardsi*). The three anterolateral teeth are separated by equal distances. In *D. tridentata* the two anterior teeth are placed close together (thereby resembling the first tooth and the additional tooth in *D. australiensis*) ; the third tooth in *D. tridentata* is placed about midway between the second tooth and the branchial groove. In *D. tridentata* the second or the second and third teeth can be absent.

4. The infraorbital region of *D. australiensis* has two lobes, the inner of which is clearly the larger. In *D. tridentata* these lobes are only faintly indicated.

5. In *D. australiensis* the epistome is as long as broad at the base. In *D. tridentata* the epistome is clearly broader than long.

6. In *D. tridentata* P5 is relatively longer than in *D. australiensis* : When extended forward it reaches the outer orbital angle, whereas in *D. australiensis* it only reaches as far as the anterior anterolateral tooth. In *D. tridentata* the propodus of P5 is distinctly more slender than in *D. australiensis*.

7. In *D. tridentata* the posterior margin of the telson of the male is distinctly truncated ; by comparison, in *D. australiensis*, it is more tapering and rounded.

8. In *D. tridentata* females of 12 mm cl. have a fully developed abdomen, while the sternal grooves reach as far forward as the bases of the first pereopods. In *D. australiensis*, a female of cl. 25 mm still has a narrow abdomen, and the sternal grooves end between the bases of the second pereopods (both characters of juvenile females). The female of cl. 18 mm is still less developed in these respects. The fact that small but mature females have been reported in species of other Decapod Crustaceans that otherwise mature at greater size, indicates that too much importance should not be attached to this character.

The small female of *D. australiensis* has a small epipodite at the base of the cheliped (the large dry specimens could not be examined for this feature), showing that the species has been correctly placed in the genus *Dromidiopsis*.

#### VERTICAL DISTRIBUTION

The few depth records of this species (by BORRADAILE and IHLE) indicate that it occurs in shallow water (coral reefs) down to a depth of about 50 m. The present material supports this distribution pattern, as it was taken from the intertidal to a depth of 62 m.

#### GEOGRAPHICAL DISTRIBUTION

The species has twice been reported from the western Indian Ocean — from the Maldivé Archipelago (BORRADAILE, 1903*a*) and from Mayotte, Comores (BALSS, 1934). The other records are from : Silavaturai, Gulf of Manaar (HENDERSON, 1893); Indonesia (DE MAN, 1888; 1896; IHLE, 1911) and Fiji Islands (BORRADAILE, 1900).

#### ? *Dromidiopsis dubia* n. sp.

(Fig. 2)

MATERIAL : Near Tany Kely, 13°27' S, 48°10' E, Madagasear; 30 m deep, sand and sponges, trawl, leg. A. CROSNIER, 1 ♂ 10.5 × 9 mm (Holotype) (B. 6894).

#### DESCRIPTION

The carapace is distinctly longer than broad (10.5 mm × 9.0 mm). The tomentum of the carapace is very fine; on the pereopods it is more strongly developed. The anterior part of the carapace is without regions. The cardiac region is barely indicated. The branchial groove is only faintly visible. The front is wide. The median frontal tooth is hardly noticeable. The lateral frontal teeth are short and rounded so that the entire front is produced only slightly forward. The supraorbital angle is indicated only as an indistinct rounded process and could be perhaps regarded as a strongly rounded supraorbital tooth. The outer orbital angle bears no tooth. A distinct orbital fissure is present. The infraorbital lobe has a broadly rounded anterior margin and does not form an infraorbital tooth. The anterolateral margin of the carapace in its anterior half carries two blunt teeth; the posterior one is the largest. The anterior tooth is placed lower than the posterior, it lies at the level of the orbital fissure. In the right half of the carapace a small elevation is visible behind the posterior tooth. There are no posterolateral teeth; neither are there subhepatic teeth.

The segments of the chelipeds are smooth except for two weakly developed tubercles on the distal margin of the carpus. The teeth on the cutting edge of the dactylus are quite characteristic. Behind the tip of the dactylus is one acute and one rounded tooth; these are followed by the largest tooth of the cutting edge, which is remarkable by being directed posteriorly and thereby quite different from those of other Dromiidae. This large, posteriorly directed tooth fits exactly into a space between the teeth on the cutting edge of the fixed finger. Behind this large tooth the cutting edge of the dactylus carries five additional minute teeth. An epipodite is present at the base of the chelipeds.

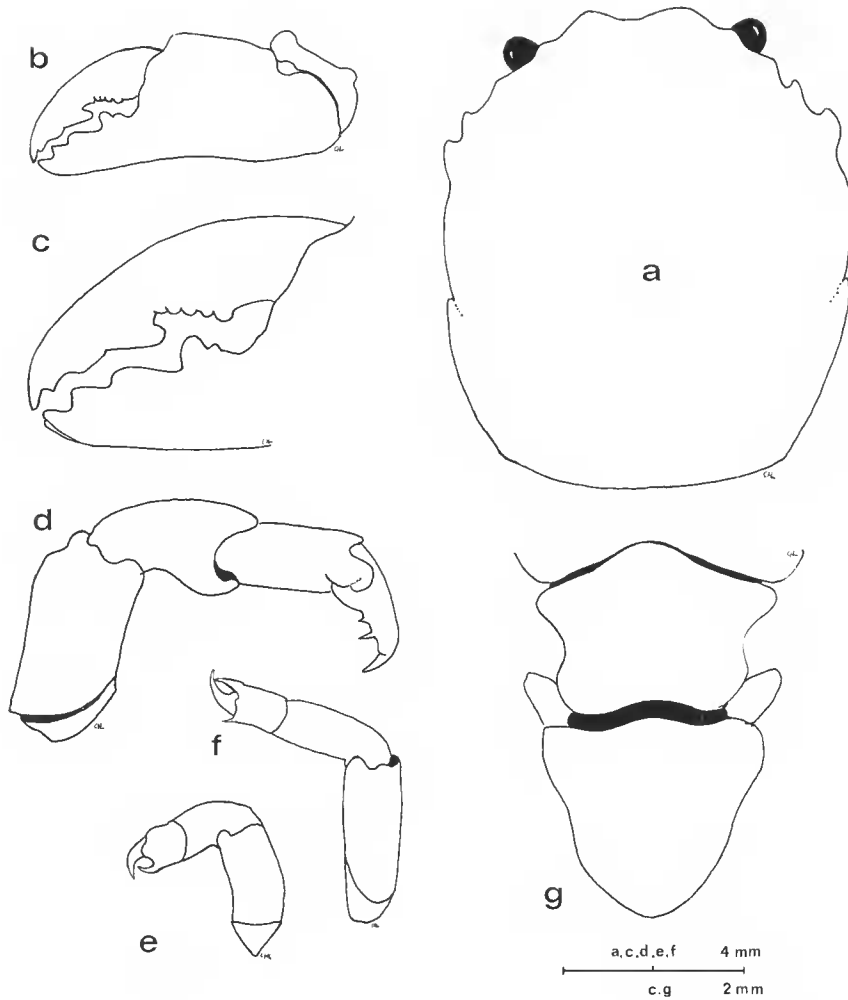


FIG. 2. — *Dromidiopsis dubia* n. sp., holotype, cl. 10.5 mm (B. 6894) : a, carapace ; b, chela ; c, fingers of chela ; d, second pereiopod ; e, fourth pereiopod ; f, fifth pereiopod ; g, last two abdominal somites. (Setae omitted.)

The second to fifth pereiopods are covered by a rather dense tomentum and have on their margins, a fringe of closely placed plumose setae.

P2 and P3 are robust. The merus is hardly widened, and its upper margin is not particularly sharp. The surface of the segments is smooth, having no obvious tubercles or conspicuous elevations. The dactylus is slightly shorter than the propodus and has a strong claw ; the lower margin of the dactylus bears spines.

P5 is longer than P4, but distinctly shorter than P3. P5 has the dactylus strongly

curved; this dactylus is opposed by a single spine on the propodus. A second spine originates from the distal margin of the propodus near the posterior margin of the dactylus. Also the dactylus of P4 is strongly curved and is stronger than the dactylus of P5. Opposite the dactylus P4 carries, on the propodus, a rather small spine; the spine on the posterior margin of the propodus is lacking.

The telson of the male is about as long as broad and is rounded distally. The sixth somite is a fraction broader than long, but is narrower than the fifth somite. The fourth to second somites are all about twice as broad as long.

#### REMARKS

The present specimen does not agree with any of the described species known to me. The obsolete median frontal tooth and the strongly rounded lateral frontal teeth give it an appearance different from that of other Dromiids. In several respects, e.g. in the shape of the front and the general body shape this species somewhat resembles *D. australiensis* and *D. tridentata*; but a direct comparison shows numerous points that easily distinguish it from these two species.

The shape of the teeth of the chelipeds is also most remarkable. The peculiar posteriorly directed fourth tooth of the cutting edge of the dactylus is quite different from anything I have observed in the other Dromiidae examined and has not been mentioned in previous published accounts of Dromiids. However, for several species the configuration of these teeth has not been described nor figured, so that it is impossible to state with certainty that the shape of these teeth is unique in the family.

The species cannot be assigned with certainty to a genus as a female is not available. The presence of an epipodite on the chelipeds clearly reduces the number of possibilities. The smooth walking legs and the carapace, which is longer than broad and does not have the regions defined, and above all its resemblance to *D. tridentata*, induces me to assign it, for the time being, to *Dromidiopsis*.

#### ? *Dromidiopsis plumosa* n. sp.

(Fig. 3)

MATERIAL: Seychelles, Reves 2 Station 1, 5°24.8' S, 57°03.5' E, 55 m deep, dredge, 2 September 1980, 1 ♂ 5.9 × 6.7 mm (Holotype) (B. 8572).

#### DESCRIPTION

The carapace is broader than long (5.9 × 6.7 mm). The tomentum consists of short plumose setae which do not completely hide the surface of the carapace. In dorsal view the setae are hardly visible. Long plumose setae are implanted along the anterior and lateral margins of the carapace. The surface of the carapace is smooth and shiny, and regions cannot be distinguished. The branchial groove is only weakly indicated.

The front consists of three teeth. The median tooth is shorter than the laterals and curved downwards, although this tooth remains visible in dorsal view. The lateral frontal

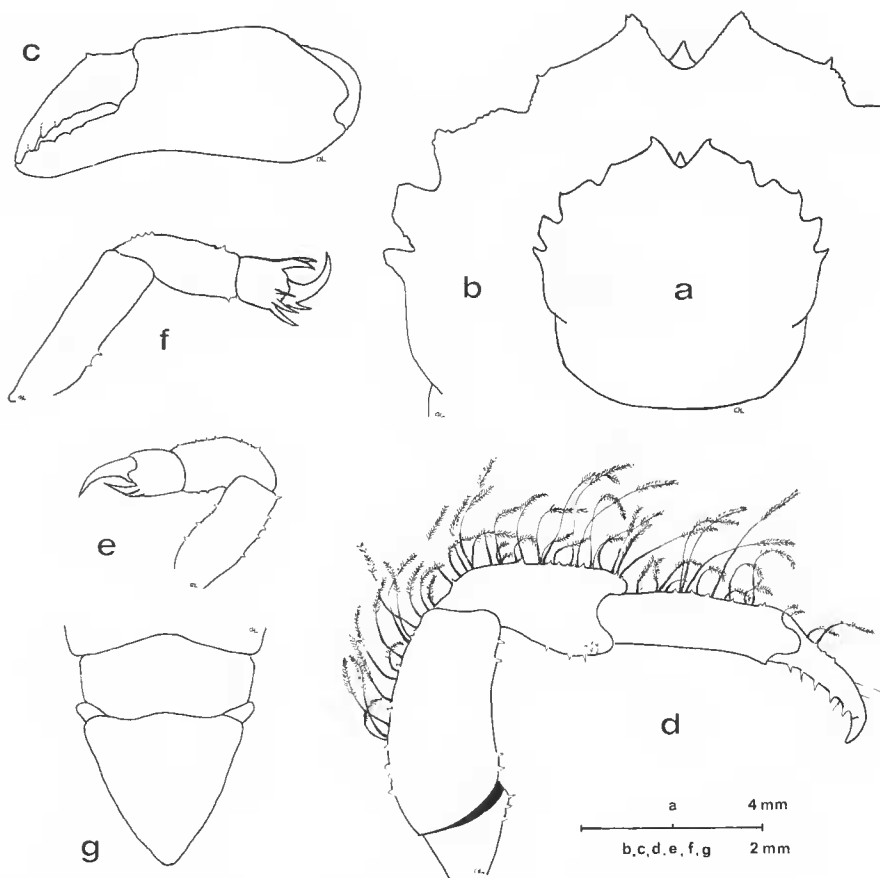


FIG. 3. — *Dromidiopsis plumosa* n. sp., holotype, cl. 5.9. mm (B. 8572) : a, carapace ; b, enlarged outline of front and anterolateral margin ; c, chela ; d, third pereiopod ; e, fourth pereiopod ; f, fifth pereiopod ; g, last three abdominal somites. (Setae omitted, except in upper margin of third pereiopod.)

teeth are triangular and acute, their tips are directed slightly outwards. The outer margin of the lateral teeth is somewhat roof-like and produced outwards. All the teeth have finely granular margins. The right supraorbital tooth in this specimen is replaced by an acute granule, while the left is hardly noticeable. The beginning of the true orbital margin is marked by a broad triangular fissure ; the presence of a fissure at this place seems rather unusual in the Dromiidae. The outer orbital angle is dentiform and separated from the infraorbital lobe by a distinct fissure. The upper margin of the infraorbital lobe is broadly triangularly produced. Behind the outer orbital angle the anterolateral margin of the carapace bears two teeth. The first of these is broad and truncated, the second is acute and spiniform. There is no posterolateral tooth, and subhepatic teeth are also lacking.

The pereiopods as well as the ventral surface of the body are provided with long plu-

mose setae, giving the crab a quite characteristic appearance. The segments of the pereopods are smooth except for very small granules that are placed on the margins of the segments and on part of the lateral surfaces; some of these granules are acute. P2 and P3 are relatively slender. The dactylus ends in a horn coloured claw; it is somewhat shorter than the propodus. A few spines are present on the lower margin of the dactylus. P5 is longer than P4 and more slender. Opposed to its strongly curved dactylus there are two spines on the propodus, one distinctly larger than the other. In the basal part of the outer margin of the dactylus a spine is present. Behind it, on the propodus, there are three more spines. In P4 two spines are placed opposite the dactylus on the propodus, one of these is so small that it may easily be overlooked. The dactylus of P4 itself does not have spines. The propodus of the left P4 of the present specimen has two spines near the base of the dactylus; but on the right P4 these are not present, although it is possible that they have been broken.

The chelipeds are provided with an epipodite. The distal margin of the carpus has two small tubercles. A tubercle is present also on the palm near the dactylus. The fingers are gaping.

The telson is as broad as long, it is triangular with a rather narrow apex. The sixth abdominal somite is about twice as broad as long, and somites 5, 4 and 3 are more than twice as broad as long. No sculpturing is visible on the somites of the abdomen.

#### REMARKS

The present species is assigned, with some doubt, to the genus *Dromidiopsis*, as its actual generic status is not clear. It agrees with *Dromidiopsis* in having an epipodite on the cheliped, in the absence of distinct regions on the carapace, in the smooth pereopods which are not widened, and in the presence of a spine on the upper margin of the dactylus of P5. It differs, however, in having the carapace broader than long, and in the peculiar fissure in the beginning of the upper orbital margin; as far as I am aware such a fissure is absent in other species of *Dromidiopsis*. Also the long and short plumose setae appear to be absent in other species of the genus. Finally there is no female in the collection, so it is impossible to describe the form of the sternal grooves in this species.

As stated above, our knowledge of the status of various genera of Dromiidae is quite unsatisfactory and a thorough revision of the group is badly needed. Several of the species now placed in a single genus do not form a natural entity, and it seems likely that several additional genera will have to be erected, while the definitions of the existing genera are in need of redefining. This however, will be possible only when far more material becomes available.

Whatever the generic position of the present specimen, it differs from all other known species, and certainly from those that have an epipodite on the cheliped. The presence of well developed male gonopods suggests that the specimen is not juvenile but fully adult and represents a small species.

**DROMIDIA** Stimpson, 1858

***Dromidia unidentata*** (Rüppell, 1830)

*Dromia unidentata* Rüppell, 1830 : 16, 17, pl. 4 fig. 2 ; ALCOCK, 1901 : 47, 48, pl. 2 fig. 4.  
*Dromidia unidentata* — BALSS, 1934 : 502 ; NOBILI, 1906a : 92 ; IHLE, 1913 : 31, 32 ; SAKAI, 1936 : 13-15, text fig. 2, pl. 6 fig. 2 ; GUINOT, 1967 : 240 (list) ; LEWINSOHN, 1977 : 9-13, text fig. 1a-e ; LEWINSOHN, 1979 : 2, 3.

MATERIAL : Nosy Be, Madagascar ; leg. P. FOURMANOIR, 1 ♂ 30 × 30 mm, 1 ♀ 21 × 21 mm (B. 6915) ; intertidal zone, with colony of *Xenia*, 8 April 1974, leg. A. CROSNIER, remains of 2 specimens (B. 7394).

RE-EXAMINED MATERIAL : Ankify, Madagascar, leg. MILLOT, det. BALSS, 1 ♀ 26 × 26 mm (B. 6938) (BALSS, 1934 : 502). — Mayotte Id., Comores, leg. HUMBLLOT, 1901, det. BALSS, 1 ♂ 13 × 13 mm (B. 6936) (BALSS, 1934 : 502). — Dubai coast, Persian Gulf, St XLVII, 25°10' N, 55°10' E, Mission J. BONNIER & Ch. PÉREZ, 1901, det. NOBILI, 2 ♂♂, 1 ovig. ♀ 15 × 15 mm, 22 × 22 mm (B. 6929) (NOBILI, 1906a : 92, originally 5 females). — Arzanah Id., Persian Gulf, St. LIII, Mission J. BONNIER & Ch. PÉREZ, 1901, det. NOBILI, 1 ♂ 34 × 34 mm (B. 6928) (NOBILI, 1906a : 92). — Aden, Obock, Gulf of Aden and Mer Rouge (mixed sample, various labels) ; leg. Dr. JOUSSEAUME, det. NOBILI, 1 ♂, 4 ♀♀ (B. 6940) (NOBILI, 1906 : 145). — Djibouti, Gulf of Aden, leg. Dr. JOUSSEAUME, 1897, det. NOBILI, 1 ♀ 21 × 21 mm (B. 6934) (NOBILI, 1906 : 145) ; Mission Ch. GRAVIER, 1904, det. NOBILI, 1 ♀ 21 × 21 mm (B. 6935) (NOBILI, 1906 : 145). — Obock, Gulf of Aden, leg. Dr. JOUSSEAUME, 2 ♂♂ (from one male only the lower, half), 1 ♀, (B. 6930) (NOBILI, 1906 : 145, mixed with other sample). — Red Sea, leg. Dr. JOUSSEAUME, 1897, det. NOBILI, 2 ♂♂ 27 × 29 mm, 23 × 24 mm, 1 ♀ 20 × 20 mm (B. 6939) (NOBILI, 1906 : 145, originally 4 females).

REMARKS

*Dromidia unidentata* is a well known species of which extensive descriptions and good figures have been published. Therefore it suffices here to refer to the publications containing those descriptions and figures : ALCOCK (1901), IHLE (1913), SAKAI (1936), LEWINSOHN (1977).

The two specimens in the present collection agree with the published accounts. The male is quite large (cl. 30 mm). The largest specimen known to me so far is the male with a cl. of 34 mm from the Persian Gulf, reported by NOBILI (1906a : 92).

VERTICAL DISTRIBUTION

Most specimens reported in the literature are from shallow water, from the intertidal to a depth of a few meters. There are few records from greater depths up to about 100 m.

GEOGRAPHICAL DISTRIBUTION

The species has a wide range in the Indo-West Pacific area, from the east coast of Africa to Japan and the Kermadec Islands (north of New Zealand). Most records are

from the Indian Ocean region. The records from the Red Sea have been enumerated by LEWINSOHN (1977), those of the western Indian Ocean by LEWINSOHN (1979). BALSS (1934) reported this species from Madagascar.

### CRYPTODROMIA Stimpson, 1858

#### *Cryptodromia canaliculata* Stimpson, 1858

*Cryptodromia canaliculata* Stimpson, 1858 : 240 ; NOBILI, 1906 : 145, 146 ; BOUVIER, 1915 : 38 ; BALSS, 1934 : 502 ; LEWINSOHN, 1977 : 18-22, text fig. 4a-c ; LEWINSOHN, 1979 : 8-10, text fig. 2B.

MATERIAL : Nosy Maroantaly, 18°25'S, 43° 55'E, Madagascar, leg. P. FOURMANOIR, 1 juv. ♀ (B. 6883). — Glorieuses Ids., N.W. of Madagascar, intertidal zone, 16 September 1958, leg. A. CROSNIER, 1 ♂ 9 × 10 mm, 1 ♀ 7 × 8 mm (B. 6860). — Mitsamiouli, N. coast of Grande Comore Id., Comores, October 1952, leg. P. FOURMANOIR, 3 ♂ 7.5 × 9 mm, 8 × 9.5 mm, 9 × 11 mm (B. 6862). — Mayotte Id., Comores, leg. HUMBLLOT, 1901, 2 ♀♀ (1 ovig.) (B. 6862 part).

RE-EXAMINED MATERIAL : Nosy Manitsy, near Androka, S.W. coast, Madagascar, leg. G. PETIT, 1926, det. BALSS, 2 ♂♂ 11 × 12 mm, 8 × 9.5 mm (B. 6945) (BALSS, 1934 : 502). — Sarodrano reef, Madagascar, leg. F. GEAY, 1901, det. BALSS, 1 ♀ (soft), (B. 6943) (BALSS, 1934 : 502). — Port Louis, Mauritius, leg. Paul CARIÉ, 1910, BOUVIER det., 2 ♂♂, 3 ♀♀ (1 ovig.) (B. 6941) (BOUVIER, 1915 : 38 — 5 ♂♂, 4 ♀♀) ; leg. Paul CARIÉ, 1910, det. BOUVIER, 1 ♂, 1 ♀ (B. 6944) (BOUVIER, 1915 : 38 — together with above mentioned material). — Tadjourah Gulf, leg. FAUROT, det. NOBILI, 1 ovig. ♀ 10 × 11 mm (B. 6949) (NOBILI, 1906 : 145). — Aden, leg. Dr. JOUSSEAUME, 1897, det. NOBILI, 1 ♀ 9 × 10 mm (B. 6942) (NOBILI, 1906 : 145). — Red Sea, leg. Dr. JOUSSEAUME, 1897, det. NOBILI, 3 ♂♂, 1 ♀ (B. 6947) (NOBILI, 1906 : 145 — 1 ♂, 3 ♀♀).

#### REMARKS

The examined specimens agree well with the published descriptions of this species. The material reported by NOBILI (1906), BOUVIER (1915) and BALSS (1934) was re-examined and proved to be correctly identified (see material list).

The species has been extensively discussed by LEWINSOHN (1977), while the same author (LEWINSOHN, 1979) compared the species with *C. pentagonalis* (HILGENDORF, 1879) ; references to older literature can be found in these two publications.

#### VERTICAL DISTRIBUTION

This is a species inhabiting shallow water, it has been found from the intertidal to a depth of a few meters. This is also true for the specimens here examined.

#### GEOGRAPHICAL DISTRIBUTION

The species is widely distributed in the Indo-West Pacific region ; its range extends from the Red Sea and the East African coast to Japan. Its localities in the Red Sea have been enumerated by LEWINSOHN (1977), those in the western Indian Ocean by LEWINSOHN (1979).



***Cryptodromia pentagonalis* (Hilgendorf, 1879)**

*Dromia* (*Cryptodromia*) *pentagonalis* Hilgendorf, 1879 : 814, pl. 2 figs. 1, 2.  
*Cryptodromia pentagonalis* — NOBILI, 1906 : 146 ; RATUBUN, 1911 : 194, 195 ; LEWINSONN, 1979 : 6-8, text fig. 2A.

MATERIAL : Nosy Be, Madagascar, intertidal zone, February 1962, leg. A. CROSNIER, 1 ovig. ♀  $8 \times 8$  mm (B. 6880). — Nosy Iranja, N.W. coast, Madagascar, dredge, 28 August 1965, 1 ♀  $6 \times 6.5$  mm (B. 6907). — Tuléar, S.W. coast, Madagascar, in association with *Xenia*, 1968, leg. HIPEAU, 1 ovig. ♀  $13 \times 13$  mm (B. 6931). — Tuléar, leg. R. PLANTE, 1 ♀  $11 \times 11$  mm (B. 6878). — Mombasa, Kenya, reef flat, 5 April 1974, leg. A. J. BRUCE, 1 ♂  $6.5 \times 7$  mm (B. 7392).

RE-EXAMINED MATERIAL : Aden, leg. Dr. JOUSSEAUME, 1897, det. NOBILI, 1 ♀  $12 \times 12$  mm (B. 6962) (NOBILI, 1906 : 146). — No locality, det. BALSS, 1 ♀ (B. 6961).

REMARKS

The present specimens agree well with the original description by HILGENDORF. LEWINSONN (1979) enumerated the characters of the species and compared it with *C. canaliculata* Stimpson.

VERTICAL DISTRIBUTION

Reported mainly from the intertidal zone. RATUBUN mentioned material from depths down to 70 m (39 fm).

GEOGRAPHICAL DISTRIBUTION

Until now the species has been reported only from the Indian Ocean area. NOBILI mentioned it from the Gulf of Aden, but there are no records from the Red Sea. A list of known localities is provided by LEWINSONN (1979).

***Cryptodromia hilgendorfi* De Man, 1888**

*Cryptodromia Hilgendorfi* De Man, 1888 : 404-406, pl. 12 fig. 3 ; ALCOCK, 1901 : 52, 53, pl. 3 fig. 11 ; NOBILI, 1906 : 146, 147 ; NOBILI, 1906a : 93, 94.  
*Dromides hilgendorfi* — BORRADAILE, 1903a : 577.  
*Cryptodromia hilgendorfi* — GUINOT, 1967 : 240 (list) ; LEWINSONN, 1977 : 13-15, text fig. 2a, b.

MATERIAL : Nosy Be, Madagascar, intertidal zone, February 1972, leg. A. CROSNIER, 1 ♀  $13 \times 14$  mm (B. 6892). — Mayotte Id., Comores, leg. HUMBLLOT, 1901, det. BALSS (as *C. canaliculata* Stimpson), 1 ♂, 1 ♀ (B. 6946 part) (not published).

RE-EXAMINED MATERIAL : Djibouti, Gulf of Aden, leg. Dr. JOUSSEAUME, 1897, det. NOBILI, 1 ♂  $10 \times 10$  mm, 1 ♀  $8 \times 8$  mm (B. 6959) (NOBILI, 1906 : 146). — Djibouti, Gulf of Aden ; Perim Island, entrance to the Red Sea ; Djibouti, leg. H. COUTIÈRE ; Perim, leg. Dr. JOUSSEAUME, det. NOBILI, 1 ♂  $11 \times 11$  mm, 2 ♀♀  $13 \times 13$  mm,  $14 \times 14$  mm (B. 6958 — mixed sample of two localities) (NOBILI, 1906 : 146, 147). — Arzanah Id., Persian Gulf, St. LIII, Mission J. BONNIER & Ch. PÉREZ, det. NOBILI, 1 ♂  $16 \times 16$  mm (B. 6927) (NOBILI, 1906a : 93).

#### REMARKS

The present specimens agree well with the original description of this species by DE MAN (1888). The various characters have been discussed by LEWINSON (1977).

*Cryptodromia hilgendorfi* is a relatively small species. The largest known specimen is a male mentioned by NOBILI (1906a : 93) ; this specimen has been re-examined by me (see material list above) and its identity confirmed. It has a carapace length of 16 mm.

BORRADAILE (1903) proposed the new genus *Dromides* with *C. hilgendorfi* as the type species. Later authors (e.g. NOBILI, 1906a) did not follow him, and I agree that there are not sufficient reasons for removing *C. hilgendorfi* from the genus *Cryptodromia*.

#### VERTICAL DISTRIBUTION

The species has been found in the intertidal zone as well as at depths down to about 70 m.

#### GEOGRAPHICAL DISTRIBUTION

The range of this species probably includes the larger part of the Indo-West Pacific region (Red Sea to Funafuti atoll, Polynesia). The published records from the western Indian Ocean are few : Red Sea (LEWINSON, 1977 — enumeration of Red Sea records). Djibouti, Gulf of Aden (NOBILI, 1906). Persian Gulf (ALCOCK, 1901 ; NOBILI, 1906a). Suwadiwa and South Nilando atolls, Maldives (BORRADAILE, 1903a, as *Dromides*). So far the species is not known from the more southern part of the Indian Ocean.

#### *Cryptodromia gilesii* (Alcock, 1899)

*Dromia* (*Cryptodromia*) *Gilesii* Alcock, 1899 : 146, 147.

*Cryptodromia Gilesii* — ALCOCK, 1901 : 54, 55, pl. 3 fig. 13.

*Cryptodromia gilesi* — GORDON, 1950 : 207-209, text fig. 2c-e ; GUINOT, 1967 : 240 (list).

*Cryptodromia gilesii* — LEWINSON, 1977 : 25, 26, text fig. 6a, b.

MATERIAL : Pracel Bank, W. coast, Madagascar, 55 m deep, sand-mud, June 1959, leg. A. CROSNIER, 2 ♂♂ 13 × 15 mm, 11 × 12 mm (B. 6879). — Mitsio Ids., N.W. coast, Madagascar, 60 m deep, sand, February 1960, leg. A. CROSNIER, 1 ♀ cl. 4.2 mm (B. 6886). — N.W. coast, 12°55.2' S, 48°28.2' E, Madagascar, 42 m deep, trawl, 2 August 1973, leg. A. CROSNIER, 1 ♂ 7 × 7.5 mm (B. 6905 part) ; 13°41.4' S, 47°49.0' E, Madagascar ; 36 m deep, trawl, 31 July 1973, leg. A. CROSNIER, 1 ♀ 7.5 × 7.5 mm (B. 6909).

#### REMARKS

Until 1950 *Cryptodromia gilesii* was generally assumed to be synonymous with *C. granulata* (Kossmann, 1878). GORDON (1950) pointed out that the two species were distinct and differences have also been enumerated by LEWINSON (1977), who at the same time provided illustrations of the carapace and male abdomen of both species.

The present specimens differ from ALCOCK's (1901) description in the following features :

1. In my material the supra-orbital tooth is quite distinct, as it is in the specimens from the Red Sea (LEWINSOHN, 1977), while ALCOCK described it as “ a hardly noticeable angulation not a distinct tooth. ”.

2. The suborbital lobe is rather variable in my material. In some specimens it is “ dentiform but inconspicuous ” as described by ALCOCK, but in others it is divided into two granular points.

3. The anterolateral margin of the carapace carries two distinct granular teeth. Anterior to these two teeth the margin has a longish, somewhat flattened tooth placed on the subhepatic region, and between this subhepatic tooth and the buccal frame another small tooth. Also the anterolateral angle of the buccal frame has a tooth-like projection. ALCOCK's description of these teeth is somewhat confusing, he wrote : “ Antero-lateral borders of the carapace cut into five small granular lobules or tubercles... ” but the next sentence “ of which only 2 belong to the true antero-lateral border... ” shows that he included the subhepatic teeth among the anterolateral. It is surprising that ALCOCK did not mention the posterolateral tooth, which is placed behind the branchial groove.

4. ALCOCK gave the following description of the spines on the propodus of P4 and P5 : “ ... ending in a hook-like dactylus, not elheliform... ”, which would lead one to assume that there is no spine on the propodus opposite the dactylus. That this is erroneous was already shown by GORDON, and also the present specimens clearly have a spine at the distal end of the propodus opposite the dactylus, in both P4 and P5. The spine of P5 being smaller than the one in P4.

The species has been well described and its identification should not cause difficulties.

#### VERTICAL DISTRIBUTION

*C. gilesii* seems to be absent from the intertidal region and is only found in deeper water. The type material came from a depth of 53 m (29 fm), GORDON mentioned the species from 38 m, I examined specimens from the Red Sea from depths between 70 and 80 m, while the present material was obtained at depths between 30 to 60 m.

#### GEOGRAPHICAL DISTRIBUTION

The species is known only from the Red Sea and the Indian Ocean. The Red Sea localities were enumerated by LEWINSOHN (1977), furthermore the species was reported from the southern Arabian Sea (GORDON, 1950) and off the Malabar coast, S. W. India (type locality, ALCOCK, 1899, 1901).

#### **Cryptodromia bullifera** (Alcock, 1899)

*Dromia* (*Cryptodromia*) *bullifera* Alcock, 1899 : 143, 144.

*Cryptodromia bullifera* — ALCOCK, 1901 : 51, 52, pl. 2 figs. 9, 9a ; BORRADAILE, 1903a : 577 ; SAKAI, 1936 : 23, 24, pl. 7 fig. 3 ; GORDON, 1950 : 206, 207 ; GUINOT, 1967 : 240 (list) ; KENSLEY, 1970 : 107, 109, text fig. 4a-c ; ZARENKOV, 1971 : 169 ; LEWINSOHN, 1977 : 15-18, text fig. 3a, b.

MATERIAL : Nosy Be, Madagascar, intertidal zone, December 1958, leg. A. CROSNIER, 1 juv. ♀  $5 \times 5.5$  mm (B. 6884). — Pointe de la Fièvre, Nosy Be, intertidal zone, 9 February 1974, leg. Bernard et Michel OPIC, 1 ♀  $8 \times 8.5$  mm (B. 7393). — Off S. coast, 25°04.8' S, 46°55.7' E, Madagascar, 28 m deep, trawl, 4 March 1973, leg. A. CROSNIER, 1 ovig. ♀  $10 \times 11.5$  mm (B. 6895). — Seychelles, Reves 2 Station 40, 4°55.6' S, 56°24.8' E, 44 m deep, dredge, 13 September 1980, 1 ovig. ♀  $5 \times 5.5$  mm (B. 7752).

#### REMARKS

The present females agree well with the published descriptions by ALCOCK (1901) and SAKAI (1936); an extensive description was published by LEWINSON (1977) based on specimens from the Red Sea, a figure of the carapace and of the male abdomen were also provided by him. KENSLEY (1970) mentioned some "tiny tubercles" on the carapace (2 anterolateral and 3 posterolateral). In the large females of the present material such tubercles are visible, however they are very indistinct.

In the present ovigerous females the sternal grooves end anteriorly between the bases of the chelipeds where they are closely apposed, but it is hardly possible to make out whether they terminate at two opposed tubercles or on a single central tubercle. In the smaller ovigerous female (cl. 5 mm) no elevations are visible at the end of the sternal grooves, but they are present in the larger ovigerous female (cl. 10 mm) and these tubercles are placed on a kind of elevated platform.

In the generic diagnosis of *Cryptodromia*, BORRADAILE (1903 : 299) stated : "The sternal grooves of the female ending apart behind the cheliped segment". As stated above it is often difficult to establish whether or not the grooves end separately, but in the present species they certainly do not end behind, but between the bases of the chelipeds. Either the generic diagnosis has to be emended or the present species has to be removed from the genus. It would seem that a revision of the genus is clearly indicated.

#### VERTICAL DISTRIBUTION

Most records mention the species from depths between 30 and 60 m, but ALCOCK (1901) reported a specimen from 880 m (490 fm). Two specimens in the present collection were taken in the intertidal zone.

#### GEOGRAPHICAL DISTRIBUTION

The species has not been reported very frequently, but seems to have a wide range of distribution which extends from the Red Sea and East Africa to Japan. The western Indian Ocean records are the following : Red Sea (LEWINSON, 1977). Gulf of Aden, near the entrance to the Red Sea (ZARENKOV, 1971). South Arabian coast (GORDON, 1950). Jangamo, 32 km South of Inhambane, Mozambique (KENSLEY, 1970). South Nilando atoll, Maldives (BORRADAILE, 1903a).

**CRYPTODROMIOPSIS** Borradaile, 1903

**Cryptodromiopsis tridens** Borradaile, 1903

*Cryptodromiopsis tridens* Borradaile, 1903 : 299, 300; BORRADAILE, 1903a : 578, pl. 33 fig. 4 ;  
WARD, 1934 : 6.  
*Dromidia fenestrata* Lewinsohn, 1979 : 3-6, text fig. 1 a-j.

MATERIAL : Glorieuses Ids., N.W. of Madagascar, intertidal zone, 16 September 1958, leg. A. CROSNIER, 2 ♀♀ 6.5 × 7.5 mm (B. 6859) ; intertidal zone, 30 January 1971, leg. A. CROSNIER, 3 ♀♀ (1 ovig.), ovig. ♀ 6.5 × 7 mm (B. 6893).

REMARKS

The five females examined here agree well with the original description of the species provided by BORRADAILE. LEWINSOHN (1979) overlooked BORRADAILE'S (1903) new species, and described the species as new under the name *Dromidia fenestrata*. The latter name must be regarded as a junior synonym of *C. tridens*. LEWINSOHN'S description and figures provide more details than given in the original account of the species.

BORRADAILE described the carpus of P2 and P3 as being distally produced into a "thorn". However, in the present material the distal part of the carpus of these legs are somewhat produced, but not thorn-like.

LEWINSOHN (1979) stated that the distal part of P4 and P5, apart from the spine that opposes the dactylus, have two additional spines : a proximal on the posterior margin of the dactylus and the other on the distal margin of the propodus behind the spine of the dactylus. However, this situation is found only on P5. In P4 the two last mentioned spines are absent. The illustrations in LEWINSOHN'S paper (fig. 1 f and g) are correct in this respect.

VERTICAL DISTRIBUTION

The few habitat records of the species indicate that it is found in the intertidal zone. The present material confirms this.

GEOGRAPHICAL DISTRIBUTION

So far the species is known only from the Indian Ocean : Minicoi atoll, Laccadives and Male atoll, Maldives (type localities — BORRADAILE, 1903). Christmas Island (WARD, 1934) and Gesira, Somalia (LEWINSOHN, 1979, as *D. fenestrata*).

**PETALOMERA** Stimpson, 1858

**Petalomera nodosa** Sakai, 1936

*Petalomera nodosa* Sakai, 1936 : 39-41, text fig. 11 ; SAKAI, 1965 : 10, pl. 4 fig. 4 ; SAKAI, 1976 : 25, 26, pl. 4 fig. 3.

MATERIAL : Madagascar, off S. coast, 25°11.2' S, 47°14.7' E, 85-90 m deep, 3 March 1973, leg. A. CROSNIER, 1 ♂ 13 × 14 mm (soft, chelipeds missing) (B. 6901). — Fort-Dauphin, S.E. coast, Madagascar, 90 m deep, sand-stones, 25 October 1958, leg. A. CROSNIER, 1 ♂ 7.5 × 8 mm (damaged) (B. 6888) ; 80 m deep, sand, dredge, 18 October 1958, leg. A. CROSNIER, 1 ♂ 5 × 5.5 mm (B. 6861).

#### REMARKS

The presence of this species in Madagasean material is surprising as until now it was known only from Japan where it was considered to be endemic (SAKAI, 1976).

The present specimens are small and in poor condition, but nevertheless their specific identity with *P. nodosa* cannot be doubted. The specimens were compared not only with the original and later descriptions and figures, but also were directly compared with two large males (cl. 19 mm) from Wagu, Kii Peninsula, Mie Prefecture, Japan (RMNH Cr. D. 32056).

The specimens examined give rise to the following comments. In the larger of the Madagasean specimens the epipodite on the cheliped is distinctly visible. The regions of the carapace are well indicated and are distinctly granular, except for the posterior part of the carapace. However, the posterior part of the carapace is not quite smooth as a faint granulation is visible in the middle ; this granulation is not shown in SAKAI'S (1936, fig. 11 ; 1976, fig. 14) text figures, but can be seen in his coloured illustration (SAKAI, 1976, pl. 4 fig. 3).

In the Madagasean material the two high tubercles on the progastric region are completely granular as far as their tips, and furthermore they are rather acute. In the (much larger) Japanese specimens the tubercles have the distal part smooth and rounded.

The high tubercle on the epibranchial region and the two on the somite of the 4th abdominal segment are distinct.

The lateral frontal teeth are slightly narrower than those shown on SAKAI'S published figures, but they fully resemble those of the present Japanese specimens. There is no supraorbital tooth, and neither is there a tooth at the outer orbital angle.

The posterolateral tooth is quite distinct. The two anterolateral teeth, however, are hardly distinguishable because they carry large granules and sometimes give the appearance of being two-topped, also between these teeth there are high granules that sometimes give the impression that there are more than two anterolateral teeth. SAKAI pointed out that the anterolateral teeth are placed so low on the carapace that they are situated below the level of the outer orbital angle. Two subhepatic teeth are placed in one line with the anterolateral teeth so that there is a continuous row of tooth-like elevations from the anterolateral margin to the anterolateral angle of the buccal frame.

The epistome, the second basal segment of the antenna, the basal segment of the antennule and the merus of the third maxilliped all are granular. The pterygostomian region is smooth except for a single row of granules along its upper anterior margin.

The telson of the male is smooth with a few scattered granules. In the median area of each abdominal somite there are two proximal granular elevations, and behind these a single longitudinal distal one. On the fourth somite the proximal elevations are high and form the pair of elevated tubercles mentioned above.

P2 and P3 are deeply sculpted and the upper margin of the various segments shows distinct knobs; both legs are granular. P5 is longer and more slender than P4. Both P4 and P5 have a spine on the propodus opposing the dactylus.

#### VERTICAL DISTRIBUTION

So far the species has been reported from depths between 65 and 100 m (SAKAI, 1976). The present specimens were taken from depths between 80 and 90 m.

#### GEOGRAPHICAL DISTRIBUTION

Previously the species was known only from Tokyo Bay and Sagami Bay, Japan (SAKAI, 1976). It is reported now for the first time from the Indian Ocean.

### **SPHAERODROMIA** Alcock, 1899

#### **Sphaerodromia nux** Alcock, 1899

(Pl. III B et IV C-D)

*Sphaerodromia nux* Alcock, 1899 : 154; ALCOCK, 1901 : 40, pl. 4 fig. 19.

**MATERIAL :** Madagascar, off S. coast, 25°50' S, 44° 36' E, 100-150 m deep, hard bottom-coral, 6 March 1969, leg. R. PLANTE, 3 ♂♂ (1 badly damaged) 51 × 56 mm, 58 × 67 mm (B. 6872) (1 ♂ TAU); 25°13.1' S, 47°17.8' E; 105-115 m deep, trawl, 3 March 1973, leg. A. CROSNIER, 1 ♂ 23 × 25 mm (B. 6922).

#### DESCRIPTION

The carapace is broader than long and is relatively strongly convex. The regions are hardly noticeable, only the cardiac region is indicated. The tomentum is very short; denuded the carapace is smooth. The front consists of two triangular teeth which are only slightly set off from the orbital margin. A central frontal tooth is not present. The supraorbital tooth is also absent. The outer orbital angle is slightly swollen; a faint orbital fissure is barely noticeable. The margin of the infraorbital lobe is slightly elevated and does not form a distinct tooth. The anterolateral margin of the carapace is without teeth. It is sharp and slightly overhanging; in its anterior part it curves downwards in the direction of the anterolateral angle of the oral field; in the subhepatic region the margin is indistinct. The branchial groove is hardly noticeable, only an incision in the anterolateral margin reveals its presence. There is no posterolateral tooth. The margin of the carapace is provided with a row of small, irregularly placed granules. The infraorbital lobe is not distinctly separated from the subhepatic region. Only a slight incision near the buccal ridge indicates the beginning of a groove which extends upwards from the margin of the pterygostomian region but does not reach the margin of the carapace. The linea dromica is distinct. The lateral surface of the carapace carries small scattered granules; this granulation is especially distinct in the anterior part. The same is true for

the infraorbital lobe. The epistome is broadly triangular ; the lateral margins are incised in the middle and somewhat produced.

ALCOCK mentioned a space between the anterior border of the third maxillipeds and the border of the buccal cavern ; in my specimens no such space is visible.

Chelipeds : An epipodite is present. The margins of the various segments are provided with short, stiff, plumose setae. The surface of the merus is smooth, the margins granulated. The length of the merus is about  $\frac{2}{3}$  the width. The upper margin of the carpus is sharply carinated, its surface is granular. The palm is rather short with a granular surface. In the upper part of the surface the granules are arranged in indistinct longitudinal rows. The fingers are about as long as the palm. The teeth on the cutting edge of the fixed finger are only slightly developed, while the cutting edge of the dactylus is without teeth.

P2 and P3 are flattened and covered with a short tomentum ; denuded, the surface is smooth and shiny. A fringe of plumose setae is present on the upper margin of the various segments of these legs. In P3 such a fringe is also present on the posterior margin of the segments. On neither of these legs are tubercles or spines present. The dactylus is shorter than the propodus, slightly curved and with a single claw. The lower margin of the dactylus carries six spines.

P4 and P5 are of approximately the same length, and about half as long as P3. Here too the margins of the segments carry stiff plumose setae. The dactylus of P4 has two small spines on the lower margin. The distal margin of the propodus carries four spines which oppose the dactylus. These four spines are more or less obscured by the presence of setae ; none of these spines has the shape of a claw which could form a chela with the dactylus. In P5 the arrangement of the spines is similar to that of P4, but the spines of the dactylus are small and transparent and thereby easily overlooked.

Male abdomen : The telson is longer than broad. The sixth segment of the abdomen is very short, and twice as broad as long. The fifth segment is somewhat narrower than the sixth. Similar to the sixth segment, the third fourth and fifth are twice as broad as long. The second segment is considerably narrower than the third and does not reach beyond the coxa of the fifth leg.

In addition to the gonopods on the first and second abdominal somites, there are minute bifid pleopods on segments 3 to 5.

The very large specimens (cl. 51 and 59 mm) are distinctly less circular in outline than the smaller ones. The carapace of these large specimens is clearly broader than long. The branchial groove is slightly more distinct, but still quite weakly developed. The infraorbital lobe and the subhepatic region close to it are more strongly granular. The carpus of P2 has a longitudinal anterior carina against which fits the carpus of P3. The dactylus of P2 and P3 are still short when compared with the propodus.

There can be no doubt that these large specimens belong to the same species as the smaller specimens.

#### REMARKS

So far *Sphaerodromia nux* has been known only from the type specimens, 1 male and 1 female, from the Gulf of Martaban, Burma, depth 70 fathoms (ALCOCK, 1899, 1901).



ALCOCK's (1901) description is slightly more extensive than the original of 1899, and is accompanied by a figure. The larger of ALCOCK's specimens had a cl. of 10 mm and a cb. of 11 mm; his material was thus quite small. Because of this I was unable to satisfactorily identify, at first, my larger specimens and it was not until I examined the present male 23 mm cl. that the situation became clear. There can be hardly any doubt that ALCOCK's specimens are juveniles, although this is not mentioned by him. *Sphaerodromia nux* thus has to be placed among the larger Dromiid species.

A second species of *Sphaerodromia* has been reported (viz. *S. kendalli* Alcock & Anderson, 1894) and originally described from the Bay of Bengal and later mentioned from Japan by BALSS (1922). The present specimens are assigned to *S. nux* rather than to *S. kendalli*. Furthermore, the suborbital lobe in *S. kendalli* is tooth-like. It is not known whether the male of *S. kendalli* possesses pleopods on abdominal segments 3, 4 and 5.

### HEMISPHAERODROMIA Barnard, 1954

#### *Hemisphaerodromia abellana* Barnard, 1954

*Hemisphaerodromia abellana* Barnard, 1954 : 101, 102, text fig. 3; GUINOT, 1967 : 241 (list); LEWINSOHN, 1979 : 10-12, text fig. 3 a-h.

*Petalomera laevis* Kensley, 1970 : 111, 112, text fig. 6 a-h.

MATERIAL : Madagascar or Comores, no details, leg. P. FOURMANOIR, 1 ♂ 13.5 × 15.5 mm (B. 6857).

#### REMARKS

The present male agrees in almost all respects with the original description of this species by BARNARD. It differs however, in that the lateral margin of the carapace carries five denticles and not two or three as indicated in the original description. Furthermore BARNARD wrote : " Long. et larg. 10 mm ". The specimen examined by me has a carapace length of 13.5 mm and a breadth of 15.5 mm, and thus is distinctly broader than long; this is also true for the specimens from Somalia mentioned by LEWINSOHN (1979) which have now been re-examined and compared with the Madagascan specimen. These Somalia specimens do not have teeth on the lateral margin of the carapace, but otherwise are so similar to the present ones and to the type that there can be little doubt that all belong to a single species. The character of the number of anterolateral teeth on the carapace is evidently quite variable.

Also *Petalomera laevis* Kensley, 1970, clearly belongs to the present species, as shown by KENSLEY's original description and figures. KENSLEY's material consisted of 1 male and 2 ovigerous females; all three have the carapace broader than long and have five denticles on the anterolateral margins.

*H. abellana* in all probability seems a relatively small species, the largest specimen known has a cl. of 14 mm (KENSLEY, 1970).

VERTICAL DISTRIBUTION

The species seems to be a shallow water form, inhabiting the intertidal zone and slightly greater depths.

GEOGRAPHICAL DISTRIBUTION

Nosy Maroantaly, Madagascar (type locality — BARNARD, 1954). Jangamo, 32 km S. of Inhambane, Moçambique (KENSLEY, 1970, as *P. laevis*). Sar Uanle, 20 km S. of Chisimaio, Somalia (LEWINSOHN, 1979). Until now the species has been restricted to the western Indian Ocean.

**PSEUDODROMIA** Stimpson, 1858

***Pseudodromia caphyraeformis*** (Richters, 1880)

*Ascidophilus caphyraeformis* Richters, 1880 : 158, 159, pl. 17 figs. 6-10.

*Pseudodromia murrayi* Gordon, 1950 : 211-219, text figs. 4A-C, 5 A-E, 6 A-C, 7 A-D, 8 A-E, 9 A-D.

*Pseudodromia caphyraeformis* — LEWINSOHN, 1977 : 34-38, text fig. 9a-e ; LEWINSOHN, 1979 : 12, 13.

MATERIAL : Madagascar, N.W. coast, 12°55.2' S, 48°28.2' E, 42 m deep, trawl, 2 August 1973, leg. A. CROSNIER, 2 ♂♂ 4.8 × 3.3 mm, 4.1 × 2.8 mm (B. 6908, B. 6912).

REMARKS

The present specimens agree well with published descriptions and figures. Extensive descriptions are provided by GORDON (1950) and by LEWINSOHN (1977).

VERTICAL DISTRIBUTION

From the intertidal zone to a depth of about 60 m. The present material was obtained from 42 m.

GEOGRAPHICAL DISTRIBUTION

So far the species is only known from the Indian Ocean area : Red Sea to Moçambique and S.E. India (Tuticorin). The Red Sea localities have been enumerated by LEWINSOHN (1977), those from the western Indian Ocean by LEWINSOHN (1979).

**CONCHOECETES** Stimpson, 1858

**Conchoecetes artificiosus** (Fabricius, 1798)

*Dromia artificiosa* Fabricius, 1798 : 360.

*Conchoecetes artificiosus* — ALCOCK, 1901 : 41, 42, pl. 3 fig. 16 ; STEBBING, 1902 : 19, 20 ; NOBILI, 1906a : 94, 95 ; STEBBING, 1910 : 346 ; STEBBING, 1920 : 253 ; SAKAI, 1936 : 42, 43, pl. 8 fig. 2 ; 1950 : 308, 309, text fig. 58a-b ; GUINOT, 1967 : 241 (list).

MATERIAL : Region of Nosy Be, N.W. coast, Madagascar, no details, 1 ♀ 22 × 22 mm (B. 6890).

REMARKS

The present female agrees well with published accounts by ALCOCK (1901), SAKAI (1936) and BARNARD (1950).

The specimen from Madagascar was compared with a female from Pondichery (Mus. Paris, n° B. 6951) and from Padang, Sumatra (RMNH n° D. 830). The comparison of these three specimens with the published descriptions confirms that there is a considerable variation in the granulation of the carapace, especially of the acute granules on the anterolateral margin that are variously shaped. However, there is a distinct difference in the granulation of all these forms of *C. artificiosus* when compared with that shown by the new species described hereafter ; no intermediate forms between the two species have been found so far.

VERTICAL DISTRIBUTION

The species has been reported from depths between about 9 and 100 m. STEBBING (1920) reported it from 460 fm, but according to BARNARD (1950) the label accompanying the specimen may be erroneous.

GEOGRAPHICAL DISTRIBUTION

*C. artificiosus* has a wide range in the Indo-West Pacific region having been reported from the east African coast to Australia and Japan. The Indian Ocean records are as follows : Persian Gulf (NOBILI, 1906a). Zululand (Natal), South Africa (STEBBING, 1902, 1910). Off Tugela river, Natal (BARNARD, 1950). STEBBING'S (1920) record from Cape Point may be erroneous (see under vertical distribution).

**Conchoecetes intermedius** n. sp.

(Fig. 4)

MATERIAL : Passe de Nosy Komba, 13°28' S, 48°21' E, Madagascar, 10 m deep, dredge, 14 March 1971, leg. M. CHAVANE, 1 ♂ 16 × 17 mm (Holotype) (B. 6891).

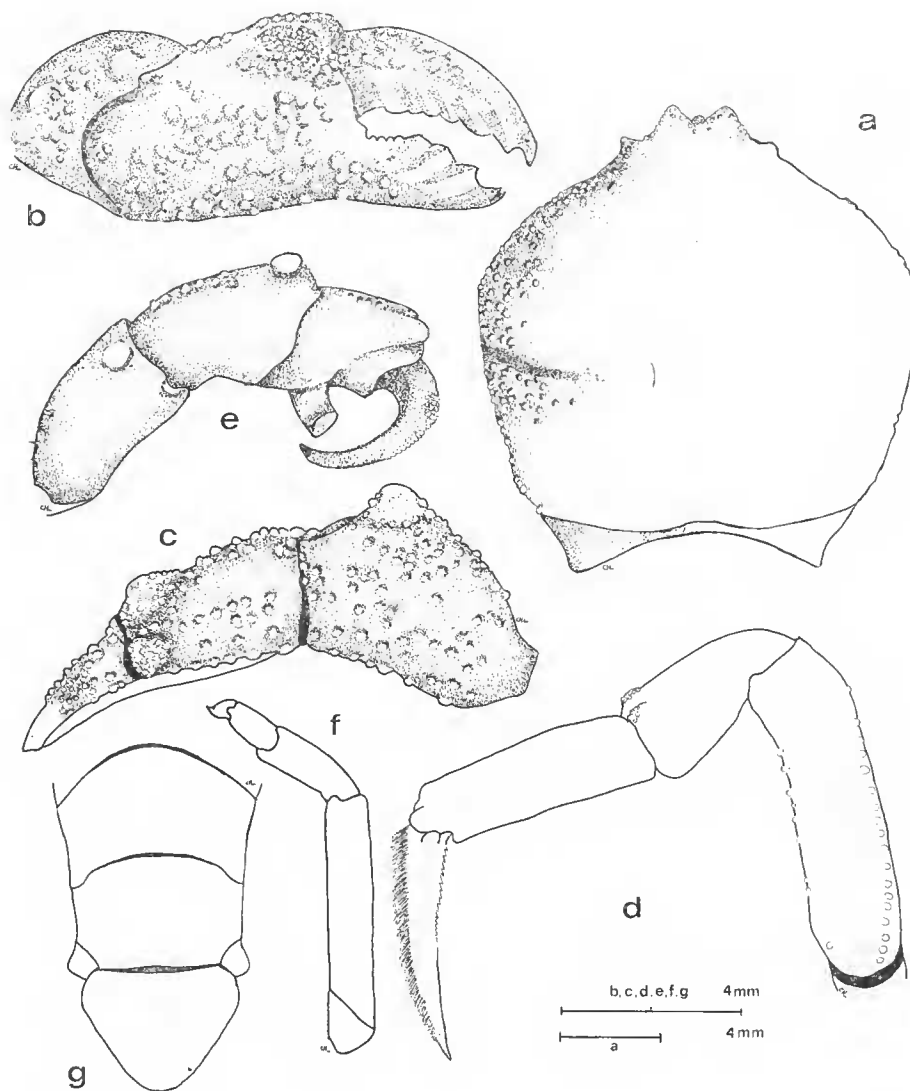


FIG. 4. — *Conchoecetes intermedius* n. sp., holotype, cl. 16 mm (B. 6891) : a, carapace ; b, chela, lateral view ; c, chela, dorsal view ; d, third pereiopod ; e, fourth pereiopod ; f, fifth pereiopod ; g, last three abdominal somites. (Setae omitted, except in dactylus d.)

#### DESCRIPTION

The carapace is slightly broader than long (el. 16 mm, eb. 17 mm). The upper surface is covered with a tomentum of very fine setae, which do not quite obscure the granulation present on the carapace. This tomentum is much finer than that of *C. artificiosus*. De-

nuded, the surface of the carapace is smooth and shiny with granules near the lateral margin from the supraorbital tooth back. Behind the branchial groove the granules are more evident on the middle part of the carapace. The area near the posterior margin of the carapace is at the very most only little calcified, this is especially true for the lateral parts. The regions of the carapace are hardly noticeable. There is no cervical groove and the branchial groove is barely indicated.

The front carries three teeth. The lateral of these, when compared with the lateral teeth of *C. artificiosus*, are short and broadly triangular. The median frontal tooth is small with a rounded tip. The margins and the apices of the teeth are granular. A rounded supraorbital tooth is present. The extraorbital angle is not acute. The infraorbital lobe is broadly triangular with a rounded apex.

The anterolateral margin of the carapace forms a continuation of the orbital margin; anteriorly it is directed obliquely outwards and then forms a regularly convex arch: anterior to the branchial groove it is directed almost straight posteriorly. The posterolateral margin is directed obliquely inwards and is slightly curved. The anterolateral margin is obtuse. The lateral margin of the carapace bears neither teeth, spines nor acute granules. The subhepatic region and the infraorbital lobe are evenly granulated. These granules do not give the impression of being arranged in transverse rows, as they do in *C. artificiosus*.

The infraorbital lobe is separated from the subhepatic region by a groove. No other grooves are present in this region. On the posterior part of the subhepatic region no granules are present, and also the pterygostomian region is without granules apart from a few near the anterolateral angle of the buccal frame.

The basal antennular segment is smooth, but the basal segments of the antenna are somewhat granular. Also the exopodite of the third maxilliped as well as the merus, ischium and coxa of the endopodite are granular.

The abdomen of the male is only very slightly granular. The telson is broader than long. The sixth abdominal segment is not narrower than the telson.

The merus of the chelipeds is about twice as long as broad; the upper margin is sharp, and like the lower surface is granular. The carpus is granular all over and carries two rather large tubercles at its distal end. The surface of the palm is provided with many granules. The palm is slightly less than twice as long as broad, it carries two distal tubercles, the outer of which is larger than the inner. The basis of the fingers is granular, but the tips are smooth and carry some scattered tufts of setae; the granulation of the fixed finger is continued onto the palm. The fingers are slightly gaping at the base.

P2 and P3 are very similar. The merus is granular, but there are only a few granules on the carpus and still fewer on the propodus. The dactylus is only a little shorter than the propodus, it is relatively slender and only slightly curved; its upper margin bears a fringe of plumose setae and a row of shorter setae is visible over the middle of the outer surface; on the inner surface of the upper margin a second upper fringe of setae is present, so that, when seen from above, the dactylus appears invested with a double fringe of plumose setae between which there is a naked groove.

P4 is distinctly shorter than P2 and P3, but also more robust. It bears granules. The distal part of the merus has a distinct tubercle; a similar, but larger, tubercle is visible on the carpus and two are present on the propodus. The dactylus is strongly cur-

ved, and, similar to the two other species in this genus, is directed backwards over a blunt process of the propodus, reaching only slightly beyond this process. The tip of the dactylus is a horny claw. P4 is hardly dorsally inserted.

P5 is very slender. The merus is about five times as long as broad. The carpus and propodus are short (the carpus being longer than the propodus). The dactylus is very small with a curved, horny apex. No spines are present on the distal part of the propodus.

#### REMARKS

The present new species can be distinguished from the other two known species of the genus by the following characters :

##### A — From *C. artificiosus*

1. The tomentum of *C. artificiosus* is much better developed and more distinct.
2. In *C. artificiosus* the cervical groove is distinct, in *C. intermedius* it is absent. Furthermore in *C. artificiosus* the branchial groove is more distinct.
3. In *C. artificiosus* the frontal teeth are more slender and sharper and have their margins serrate. The supraorbital tooth and the infraorbital lobe in *C. artificiosus* are more acute than in *C. intermedius*.
4. In *C. artificiosus* the anterolateral margin is irregularly granular and part of the granules are acutely spiniform ; furthermore the margin is less distinctly arched.
5. In *C. artificiosus* a tooth is present behind both the cervical groove and the branchial groove. Such teeth are lacking in *C. intermedius*.
6. In *C. artificiosus* the subhepatic region is irregularly granular, and a more or less distinct row of granules can be distinguished extending from the cervical groove in the direction of the anterolateral angle of the buccal field.
7. The dactylus of P2 and P3 in *C. artificiosus* has a double row of setae on the lower margin. In *C. intermedius* such a double row is absent.
8. P4 of *C. artificiosus* does not have rounded tubercle on the propodus, carpus or merus, but there is a proximal spine on the outer surface of the propodus. Such a spine is not evident in *C. intermedius*.

##### B — From *C. andamanicus*

*C. andamanicus* is a poorly known species. So far only six specimens have been mentioned in the literature, viz. three in the original description by ALCOCK (1899, 1901), two females by IHLE (1913) and a single male by LAURIE (1906). This seems to be a small species. IHLE mentioned an ovigerous female of 5 mm cl. The largest specimen mentioned by ALCOCK had a cl. of 7.5 mm and LAURIE's male measured 10.2 mm cl. IHLE's material agrees well with the original description. Based on this description the following differences are apparent when *C. andamanicus* and *C. intermedius* are compared :

1. *C. andamanicus* lacks the supraorbital tooth.
2. In *C. andamanicus* the palm of the chela has a single high tubercle, while both

*C. intermedius* and *C. artificiosus* have two tubercles there. The presence of the single tubercle is mentioned by ALCOCK and confirmed by LULE.

Direct comparison of the present species with future material of *C. andamanicus* may reveal additional differences. *C. intermedius* seems to be closer to *C. andamanicus* than to *C. artificiosus*.

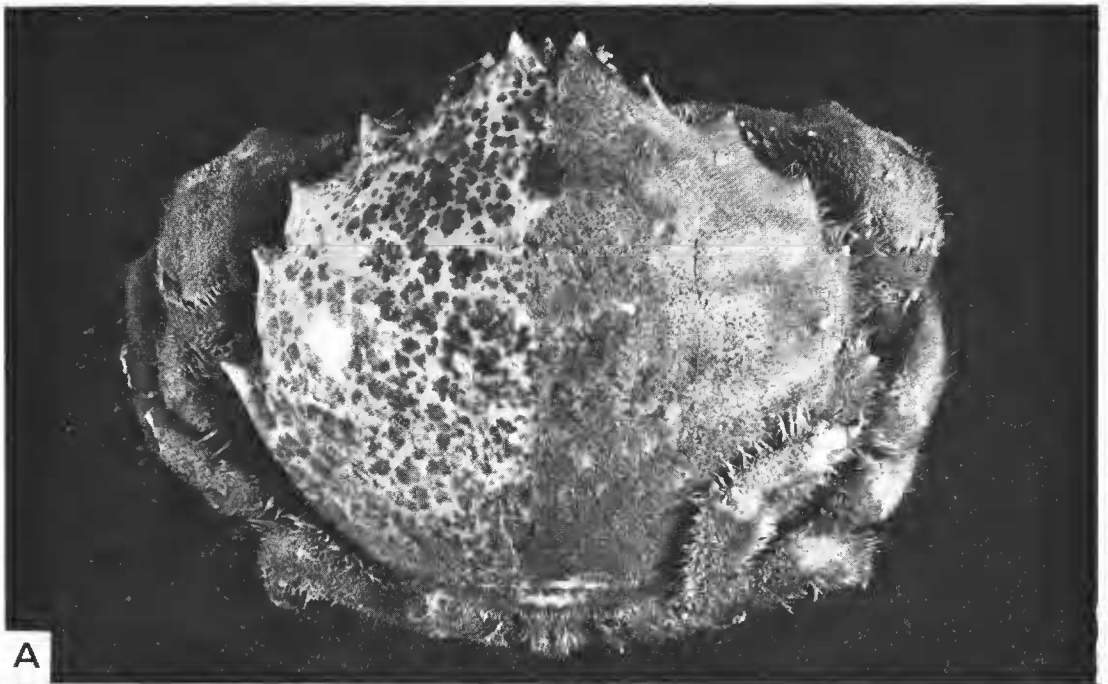
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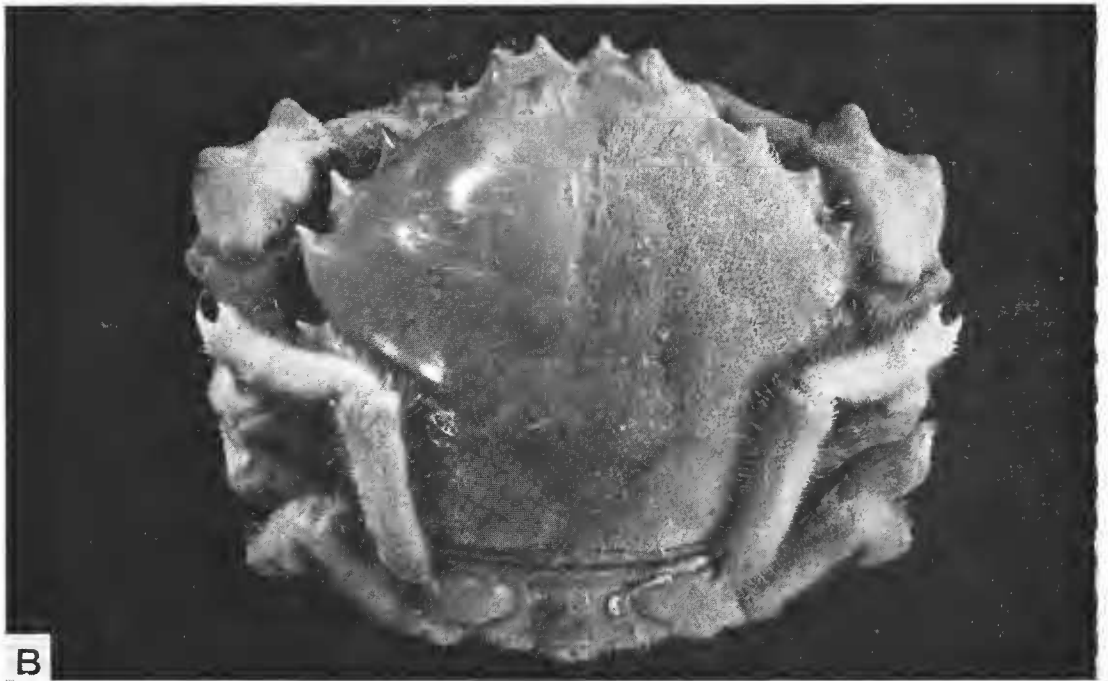
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A



B

PLATE I

A, *Dromia dehaani* Rathbun, cl. 52 mm, Seychelles (TAU) ; B, *Dromia intermedia* Laurie, cl. 40 mm, Seychelles (TAU).

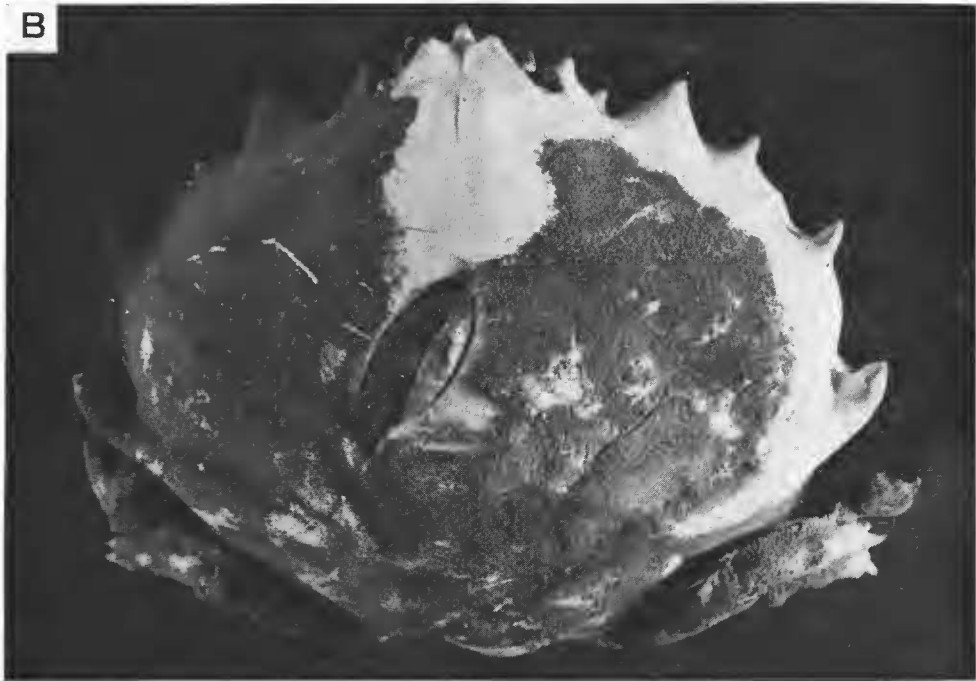
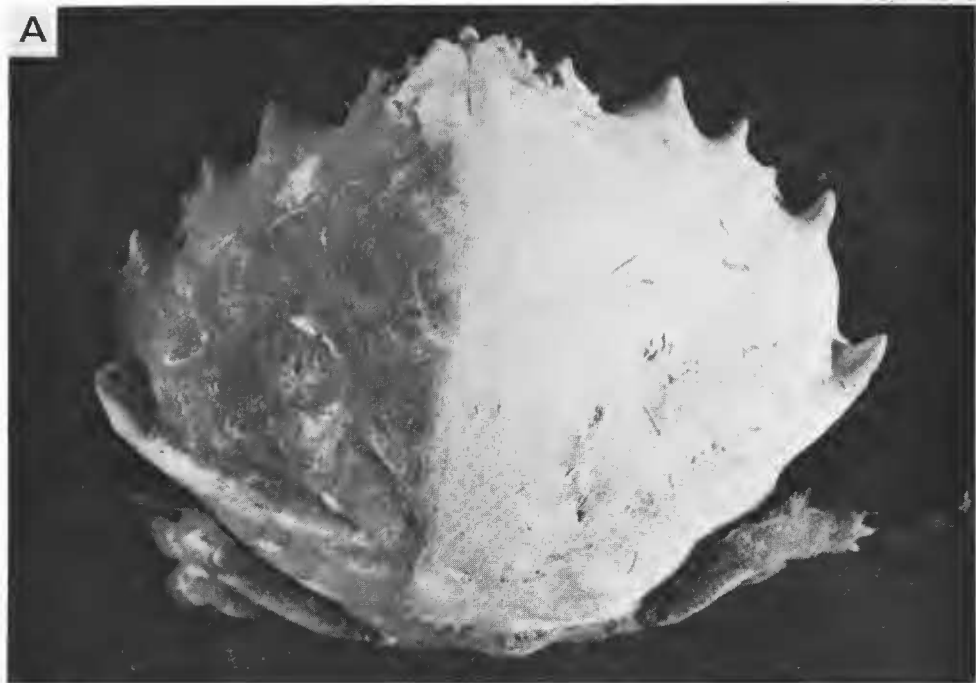


PLATE II

*Dromidiopsis dormia* (Linnaeus), Madagascar : A, male, cl. 114 mm (B. 6924) ; B, male, cl. 111 mm (B. 6925). (Note the obsolete third anterolateral tooth of the carapace in B.)

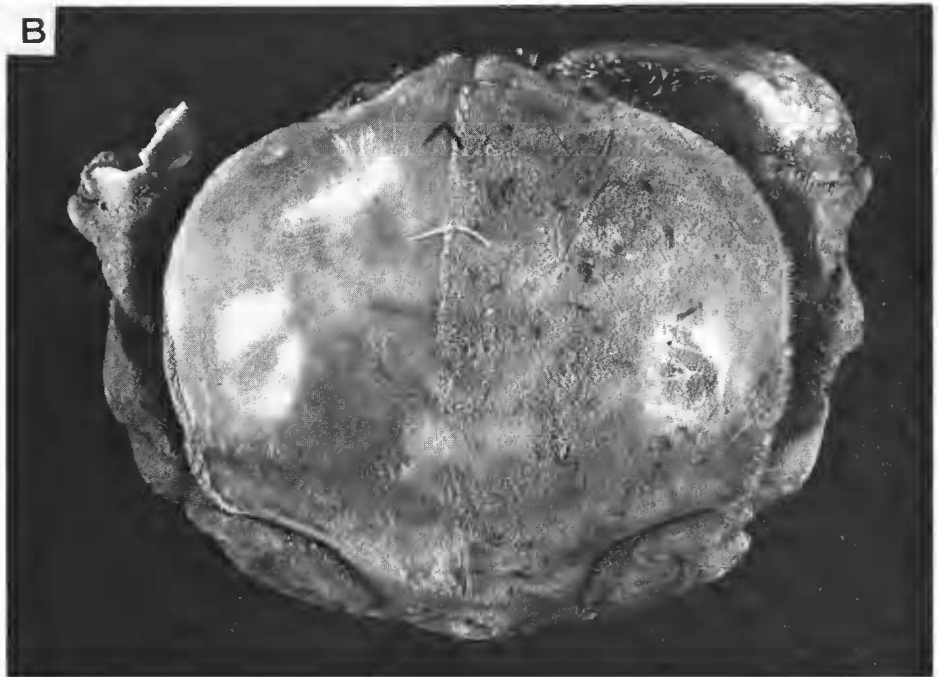


PLATE III

A, *Dromidiopsis australiensis* (Haswell), cl. 25 mm, Port Jackson, Australia (probably syntype) ; B, *Sphaerodromia nux* Alcock, cl. 51 mm, Madagascar (TAU).

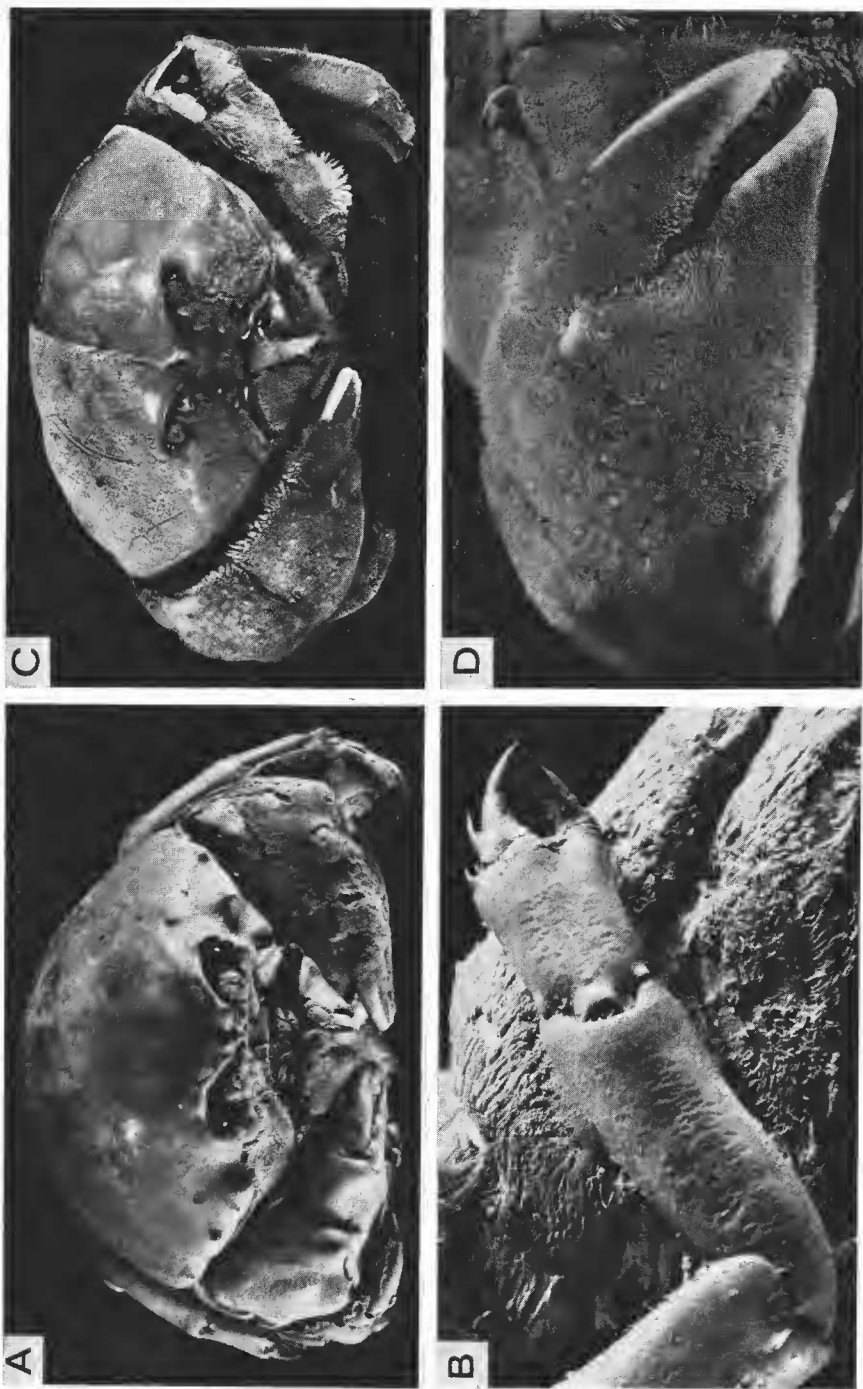


PLATE IV

*Dromidiopsis australiensis* (Haswell), cl. 25 mm, Port Jackson, Australia (probably syntype) : A, frontal view ; B, fifth pereiopod. — *Sphaerodromia nux* Alcock, cl. 51 mm, Madagascar (TAU) : C, frontal view ; D, chela (note the obsolete dentation of the cutting edges).

